

Interactive comment on “SimSphere model sensitivity analysis towards establishing its use for deriving key parameters characterising land surface interactions” by G. P. Petropoulos et al.

Anonymous Referee #2

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The authors present a detailed parameter sensitivity analysis of the SimSphere SVAT model. This study extends on previous work by looking at modeled surface fluxes and states under different atmospheric conditions. The global sensitivity analysis uses BACCO, an advanced technique that includes the construction of a model emulator and quantification of related uncertainty. In my opinion the manuscript is acceptable with revision, but represents only a minor advance over previous studies. It is stated that the analysis can direct future efforts to reduce the uncertainty (p. 8 line 16). In this sense prior information about a site should be used to reflect knowledge, or lack thereof, about certain parameters. Instead the entire theoretical range of possible values is taken, except for the latitude, longitude, and atmospheric data (page 11). At

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a given site, the slope, aspect, and station height should be well known as well. As mentioned in the discussion, it is not surprising that slope and aspect are critical controls on model outputs because of their impact on incident solar radiation. What is presented here is a parameter sensitivity analysis, in the pure sense, over the model's entire possible parameter space – which is interesting and useful, but doesn't provide much guidance on how to reduce uncertainty. In my opinion this would have higher impact if the analysis were to use estimated site-level parameters with realistic observation uncertainties. The analysis builds on previous analysis by looking at a new site. However, the atmospheric sounding is not shown – I think this deserves a figure to visualize how conditions are different from previous studies. Also while this analysis shows that previous results generally hold at a new site, the MS represents a small incremental advance over previous work. How do parameter sensitivities vary over a range of soundings? Alternatively, one could compare and contrast the sensitivities between 2 soundings (extremely wet vs. dry).

Page 11 lines 5-10 Please include a table or specific reference for the ranges of uniform priors, and for the mean and standard deviations of the Gaussian priors. Page 11 line 14: Why 11 AM? Is this simply when the sounding is available? Is this late enough in the day to observe midday depression in photosynthesis and related effects on surface fluxes? Is surface albedo a SimSphere parameter? It seems this would also be quite important but it is not shown.

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