Interactive comment on "Simultaneously Determining Global Sensitivities of Model Parameters and Model Structure" *by* Juliane Mai et al.

Gabriele Baroni

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Dear Juliane, dear Authors,

I have really appreciated that your study has been motivated by, among others, one of my papers (Baroni and Tarantola, 2014). I also think your manuscript can be a nice contribution to the literature, but I leave to the official Reviewers to judge with more specific comments. When reading this preprint, however, I found the need to add this short comment to clarify the terminology. I hope this will also help to strengthen your work.

Sincerely, Gabriele Baroni

Comments

In this study, you have introduced the use of weights that can take on non-integer values to account for model structures in the analysis. As you correctly cited I used, in contrast, discrete integer values in Baroni and Tarantola (2014). However, I find important to underline also here that this "trick" has been previously used. I think that I had properly acknowledged that in my paper and I paste the reference below for sake of clarity:

"The use, at step 5 of the framework, of a discrete scalar factor of the size of the realizations generated, enables us to extend the GSA also to non-scalar sources of uncertainty. This approach was introduced by Crosetto and Tarantola (2001), who proposed the use of a sensitivity analysis of a binary input to 'switch' the uncertainties of a rainfall intensity map on and off at the same rate (i.e. for N/2 runs, the switch is set to off and for the remaining N/2 runs it is set to on), allowing their relative importance to be determined. The same approach was then improved by Lilburne et al. (2003) and Lilburne and Tarantola (2009) who explicitly introduced the discrete uniform distribution associated to the different realizations of each specific source of uncertainty as considered in this framework."

Additional discussion on the use of discrete random variables can be found also in:

Plischke, Elmar, Emanuele Borgonovo, and Curtis L. Smith. "Global Sensitivity Measures from given Data." European Journal of Operational Research 226, no. 3 (May 1, 2013): 536–50. https://doi.org/10.1016/j.ejor.2012.11.047

For this reason, I found misleading to read in your manuscript that you compare your xSSA method with "Baroni method". Instead, I suggest using something like "continuous weights method" vs. "discrete values method". In my opinion this would better describe what you are comparing.

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