Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-48

Anonymous Referee #1

Referee comment on "How biased are our models? – a case study of the alpine region" by Denise Degen et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-48-RC1, 2021

This study demonstrated that focusing analyses purely on measurements could introduces bias. This research is performed based on a geothermal model, and Global Sensitivity Analysis and Reduced Order Modeling methods are used to illustrate the influence of data distribution. The authors used a weighting scheme to compensate for parts of this bias caused by data distribution. However, I think the more important issue in this study is the general rule of a reliable weighting scheme. In addition, some important details are not clear in this manuscript and should be addressed. Please see the specific comments below.

1. Line 140 Are the weights determinted based on the number of data points? In addition, the author should describe how to use these weights briefly.
2. Line 145 The two models have different geological layers (31 and 34), and why they have the same model space?
3. LIne 178: what's the meaning of this threshold? the first- or total order indices?
4. Line 184: Before Figure 4, please explain all model parameters in a table.
5. Line 304: Again, how to use these weights? Are these weighs used for sensitivity analysis? Please give the formulas;
6. Line 316: It seems that the appropriate and reliable weighting scheme is crucial to compensate the data distribution problems. In addition, does the inappropriate weighting scheme may lead to bias to model output?
7. Line 325: The authors should describe the RB surrogate models, e.g., the accuracy, the cost.
8. Line 340: Please give the results of model calibration, e.g., RMSE, R2.