

Geosci. Model Dev. Discuss., referee comment RC3
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Comment on gmd-2021-377

Anonymous Referee #3

Referee comment on "loopUI-0.1: indicators to support needs and practices in 3D geological modelling uncertainty quantification" by Guillaume Pirot et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-377-RC3>, 2022

Overall, I thought this was a very well written manuscript. Any tool(s) that encourage EDA, involve exploring uncertainty, and make this accessible are needed in our industry. My main concern is the difference between uncertainty quantification and visualization tools. The authors should make it clear that the focus here is EDA and visualization, while the uncertainty quantification (local or global) is not really the focus. Input data/parameter uncertainty (p19) is a good thing to focus on and is different to local/global uncertainty, which is not the focus here; for example, this usually requires some form of model, authors mention a 'Gaussian world'.

Major Changes:

I personally have not completed research based on surveys, but there are standard methods for presenting and developing these surveys. There are many details of surveys that are important for understanding/interpreting the results, some of these include: Which individuals (not names, but their background/industries/etc) were solicited to complete the survey? How many responded vs. how many were asked? Is 35 enough? What industries responded or were asked? Does this represent a reasonably diverse cross section through the industry or were only Australian professional in mining surveyed? Were these geomodelers, managers, junior/senior geologists/engineers? How was bias minimized? How were the questions decided upon? How were the multiple-choice answers selected to make sure the project goals were achieved? The majority of the justification in the work is based on conclusions drawn from these survey results, please expand on the details.

I am not sure how Section 3 follows from the survey Section 2. There are many existing software/tools/scripts/etc available to quantify uncertainty and then visualize uncertainty (which I would consider different goals). Based on Q10, it seems like the biggest issue is underestimation of global uncertainty, but this is not addressed. Poor transition between sections 2 and 3.

P8 Why are these 3 scenarios considered? Is this problem specific? Is this a good analysis for all datasets?

I am concerned readers would confuse the models generated in Figure 5 with more typical continuous or categorical geomodels (i.e.. a Gaussian world). While there is certainly value to the proposed models, these would have limitations compared to industry best practice, please make this clear.

Not quite sure what is meant by 'underlying scalar field derived from implicit modeling'. Implicit modeling is a class of techniques, seems like something specific is used in Figure 5. Explain what is meant by this.

P12 Why are you discussing connectivity? Is this for a mining application (the survey was mining focused) or petroleum or hydrology? Would help to know what groups was solicited for survey results and the target audience for your tools.

Some minor comments:

Figure 2: I think the authors mean realization (not 'real')

Figure 2: replace (or add) the type of data for 'data 1' and 'data 2' (I'm guessing drillhole/well samples and remote/production data).

Figure 8: is this the variogram for the 'model'? Elaborate on the appropriateness of this. Clearly this is not the variogram for the underlying sample data.