

Anonymous Referee #2, 09 Apr 2022

Dear Editor

Determining the uncertainty in geological models is a crucial steps as it directly affects the next steps of geoscience projects.

In this Manuscript the authors have proposed some indicators for determining the uncertainty in the geological models. This is interesting and well written manuscript. I found this manuscript to be a very interesting read, specially from practical point of view, and one that is certainly worthy of publication.

*Answer: We thank referee 2 for his/her positive review and comments.*

I have just some small comments that I would like to be addressed by the authors:

Beside the indicators that you have already mentioned in manuscript, What other parameters one can used as an indicators (local or global) for determining uncertainty in geological models?

*Answer: As stated in the discussion, the presented indicators are non-exhaustive and remain a subjective choice. One could also use through transition probabilities, transiograms or cross-to-direct indicator variogram ratios. Another possibility is to consider summary metrics of lower dimensional model representation.*

You have proposed different uncertainty indicators. Which of proposed indicators would be preferred to use firstly? Which of them are more reliable and adequate for determining uncertainty?

*Answer: We cannot recommend a specific indicator. Some indicators might be more suited in specific circumstances (specific to the modelling objectives). However, looking at the most shallow learning curve for a typical modeller/geologist... might suggest starting with cardinality, that simply states how many different lithologies are present at a given location. Then entropy will become more appropriate when the geologist starts to compare ensembles of models with different stratigraphies (in which case the total number of lithos will change, making cardinality inappropriate). The geologist may then want to know what effect all this uncertainty has on relationships expressed in the model, so they may then use the hamming or spectral distances. In addition, a good strategy might be to compute as many indicators as you can afford in your budget (see Table 2 for indicative computing requirements), another one would be to select a subset of voxets from your ensemble on which you can compute all indicators and perform a selection of the most informative or suitable ones prior to computing them on the whole set. The discussion has been completed accordingly.*

Line 294: I don't consider Wikipedia as a scientific reference. Please eliminate it from you manuscript.

*Answer: This has been corrected.*