Interactive comment on "Topological Analysis in Monte Carlo Simulation for Uncertainty Estimation" *by* Evren Pakyuz-Charrier et al.

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Authors response to G. Caumon comments

1 General comments

The relative lack of variability is actually an effect of the initial parameterization of the co-kriging interpolator for the cover unit (blue) and folded units (pink). A strong variographic anisotropy was enforced on these units over the X axis. This was done to prevent excessive variations within the plausible model suite and ease interpretation of results. The paper was updated to reflect this point.

2 Acronyms and wording

>The UIM and PGM acronyms have been removed and replaced with their fully descriptive names.

>The MCUE acronym was replaced with MCUP (Monte Carlo Uncertainty Propagation).

>The paper now refers to topologically distinct or topologically similar models instead of geologically compatible/incompatible.

3 Motivation

The motivation of the paper cannot be justified by the need for clustering as that would place the conclusion before the premise. This paper is a proof of concept that the most basic topological signatures may be clustered into topologically coherent groups. This fact had to be observed before it is ever considered as an appropriate method of analysis.

4 Heteroscedasticity

Correct, dependency of errors is related to the type of data that is collected and should not be systematically assumed independent. Miscalibration/drift induced bias is not a form of interdependence of errors. This kind of errors stem from the instrumentation rather than from the measurements themselves. The next measurement might be biased the exact same way as the previous one yet not be dependent on it. There will be a certain level of correlation between the two that depends on the severity of the bias. Essentially, both measurements are partially dependent on the bias rather than each other. That is not to say that physical measurements are always independent, seismic data does display such properties. Assertions about heteroscedasticity being linked to dependency were removed.

5 Topology

The diagonal actually encodes the existence of a unit. It is fairly common to filter out any model with a missing unit (non-unit diagonal) although not mandatory. Therefore,

the diagonal should be retained by default. The number of units in a model may vary from the original model number down to a single unit.

6 Cluster Entropy

The equation is not only incorrect, it is irrelevant to this application. The correct equation was put in place.

7 Minor remarks

>A model can be abstracted to its contact surfaces of triple lines in an attempt to decrease its dimensionality while retaining most of its information.

>Removed.

>Figure 7 includes such table. Other captions updated for clarity.

>Yes and no. This process tends to generate a long trail of unit clusters with very low statistical significance. However, the uncertainty analysis is performed on a per cluster basis and is therefore unaffected by their removal. That is, adding or removing a cluster does not affect the results of the remaining ones.

>Unfortunately, we did not have access to this material at the time of submission nor do we have access at this date.

>References to the appendices were added inline.

8 References

Relevant references were added.

9 Others

See the marked-up version of the manuscript for more details.