

# ***Interactive comment on “Automated Monte Carlo-based Quantification and Updating of Geological Uncertainty with Borehole Data (AutoBEL v1.0)” by Zhen Yin et al.***

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Geological models can be more accurate and actual with coupling more borehole data in models. Meanwhile, the data sizes of geological models increase with the developments of field projects and participation of new borehole data. During dynamic process of subsurface applications such as groundwater, geothermal, oil, gas, and CO<sub>2</sub> geostorage, uncertainty quantification is the key for decision making. As the authors mentioned, uncertainty reduction is a time-consuming work which requires iterative model rebuilding using conventional inverse methods. In order to make the model adhere to geological rules, geological modeling often requires significant individual/group ex-

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expertise and manual intervention which will need often months of work after new data is achieved. In this paper, the authors generalized a Monte Carlo-based framework for geological uncertainty quantification and updating. Their methodologies were developed with the BEL protocol for uncertainty quantification. The extension of directly forecasting results an extreme fast computation of posterior geological model, by avoiding conventional model rebuilding. The proposed framework also allows automation of geological UQ. This paper is interesting and in an area worthy of investigation. Overall, this paper is well-organized and well-written. This paper can be accepted by addressing the following minor comments.

1. The advantages and disadvantages using your method for UQ and updating should be further illustrated by comparing with typical conventional method. At the same time, its applicable scenarios are suggested to be provided which can give guidelines for field application.
2. As you mentioned, current method is only designed to globally adjust the model, not locally at the borehole observation. Could you provide your idea on further solution in more details?
3. Could provide the specific performance parameters of CPU which can show the improvement on calculation efficiency more accurately?
4. The authors are suggested to unify the multiplication sign through the whole manuscript?
5. Please add a "." between "Figure 19" and the "Prior and posterior..." to keep in accordance with other figures. Please check similar problems accordingly.
6. The usage of abbreviation such as DF should be noticed. Abbreviations should be defined when they are first mentioned in the text and should always be used afterwards.
7. Discussion and conclusions are suggested to be separated into two parts. Please provide conclusions point by point which can help reader to understand the main con-

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tributions of the paper. Meanwhile, future researches should be clarified according to the limitations of proposed method.

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