The current manuscript is about an automated workflow between structural geological models and physics-based numerical models for evaluating structural uncertainties in HT-ATES. This workflow is tested on 2 examples: an example with variable reservoir thickness and an example of a wedging reservoir with a sealing fault zone. Of course, an automated workflow is of great importance for mesh-based simulations, as re-meshing can be avoided. Nevertheless, the applications should be chosen so that they are not just a proof of concept but can also be used for more sophisticated uncertainty analyses. In the applications presented, a variation in the thickness and position of a sealing vertical fault zone within a thinning geological layer was evaluated. This is a good start but currently seems to be the limit of the method used. Furthermore, only 3 cases were calculated for the first reservoir and only 17 cases for the 2nd reservoir, which is the lower limit for an uncertainty analysis. The content of the manuscript is adequate for GMD, but major corrections are required in order to accept the manuscript.

P1L19: What does “thick” reservoir mean. There is a noise function on the top and bottom surfaces which alters the reservoir thickness and it should be described that way.

P1L23: The uncertainty analysis was carried out over a range of 4 m to 118 m for the distance from the fault zone to the well. What is the basis for this range. There is no information whether this comes from the thermal radius of the storage cycles or from geological modeling.

Abstract: It is not clear, what is the motivation and the scientific question that is to be answered? It appears that the main consideration is the thickness variation due to some random noise functions and the distance of a sealing fault zone from the wellbore. It seems that the presented approach is limited here for a vertical fault zone with an offset greater than the reservoir thickness. Only in this way the fault zone could be implemented as a hydraulic barrier. What natural scenario is this assumption based on? Does this approach work for inclined faults with less offset and acting as barrier or pre-dominant flow-path, too?

P2L35: ATES characterization using push-pull tests are described in: “Best practices for characterization of High Temperature-Aquifer Thermal Energy Storage (HT-ATES) potential using well tests in Berlin (Germany) as an example, Geothermics, Volume 116, 2024, 102830, ISSN 0375-6505, https://doi.org/10.1016/j.geothermics.2023.102830.”

P2L45: (e.g., well configuration, transmissivity, flow rate, conductivity, …) → (e.g., well configuration, transmissivity, flow rate, and conductivity)

P3L64: “…transfers stochastic structures from geological uncertainty models to a fast and reliable numerical meshing tool…”. No geological uncertainty model was described or presented in the present study. How should the scientific community evaluate whether the transformation of a geological model into a numerical model is possible using the presented approach? Here a new mesh is generated and not an existing model is transferred.

P3L85: “…flow rates of <0.5 l/s…”. Flowrates should be related the pressure responses. It is not clear if the provided value a design parameter or a limitation by the reservoir performance or submersible pump?

P4L97: “To perturb the geological model, a randomized noise is superimposed on the top and bottom surfaces of the reservoir layer.” But it is not clear which conceptional geological model is responsible for such a noise function. What would be the geological process behind?

P4L100: “For the bottom surface, the range of perturbation is increased to ± 15 m due to the decrease in the quality of seismic data with depth.” Again, what is the basis or measurement for assuming that magnitude and distribution of noise? It seems to be a random number.

P5L127: A normal fault with a vertical offset of more than the reservoir thickness is presented. Main question is, what is the stress state to generate a normal faulting with such an offset? Generally, normal faults dip with 40 to 70 degree.

P6L145: The sealing fault is represented by an offset exceeding the thickness of the aquifer. To mimic the sealing fault this could even be done by truncating the model at a designated distance. I believe it is worth to check if a truncated model (at the distance of the sealing fault) would provide the same result as the model with fault offset. This could be a discussion point.

P6L149: It is still unclear if the fault itself is sealing or the offset greater than the thickness of the reservoir generates the sealing feature. I assume that the second case is the one discussed/represented in the study. Otherwise the question arises, how a sealing fault is implemented in the FEM. Is the permeability of the fault set to zero? Is flow perpendicular to the fault possible (fault is transparent to flow)?

P6L151. Ones more, the normal fault is represented as vertical fault. Is this a limitation of the method? How dip and dip-direction are quantified. If no quantification was made, dip and dip-direction should be analyzed in the uncertainty study.

P6L152-155: As mentioned before only few scenarios were considered for this uncertainty analyses. One advantage of the automatized workflow should be the performance. Why not thousands of simulations were performed for varying distances, strike directions and dip angles?

P11L253: Moose is updated frequently. Therefore, TIGER should be maintained. By my knowledge this is not the case any longer. Therefore, a future use of TIGER and the reproducibility of the presented simulations maybe questionable? Maybe the perspective or alternatives like GOLEM (Cacace, M. and Jacquey, A. B.: Flexible parallel implicit modelling of coupled thermal–hydraulic–mechanical processes in fractured rocks, Solid Earth, 8, 921-941, https://doi.org/10.5194/se-8-921-2017, 2017.) should be mentioned as well.

P12L282: How you deactivate the temperature BC for production scenarios? Temperature BC should be assigned for injection mode. For production mode these BC should be deactivated. Was this deactivation considered, if so it should be described shortly.

P13L310: If no boundaries are defined in general a no flow boundary is the default assignment. I wonder if Tiger would deal differently. Therefore, I suggest to check if the lateral borders are open to flow or no-flow boundaries.

Figure6: What is the reason for an injection temperature of 39C and not of 40C as the reservoir temperature?

P15L341: "Despite the negligible difference, the case with a fault located 48 m in the west of the well has the best performance…". Yes, but it seems the in a distance of 45 m and more the fault has no influence anymore. It seems that the thermal radius/plume has a radius of approximately 45 m. An explanation is missing why a fault zone having a distance of more than 45 m should influence the simulation results.

Figure 7: What is the vertical offset of the fault for these scenarios. It is mentioned to be more than the aquifer thickness. Why we do not see a sub-figure of such a simulation. I suggest to add a figure showing at least one example of the reservoir with fault offset and the related pressure and temperature field. In figure 8 the fault is visible but not the offset. Maybe this figure can be improved be showing all geometric features.

P16L355: Ones more, what is the thermal radius of your base case. It can be approximated by using the presented estimation in: Daniel T. Birdsell, Benjamin M. Adams, Martin O. Saar, Minimum transmissivity and optimal well spacing and flow rate for high-temperature aquifer thermal energy storage, Applied Energy, Volume 289, 2021, 116658, ISSN 0306-2619, https://doi.org/10.1016/j.apenergy.2021.116658.

It seems to be about 50 m. Therefore, a fault in 48 m distance has no influence?

Figure10: As ask before, what would be the effect of truncated model domain at a distance equivalent to the simulated sealing fault. I assume you will obtain similar results without simulating the fault offset.

P21L411: The chapter “4 Discussion” reads like a summary and not like a discussion. I suggest to rewrite this paragraph to introduce to the subsequent discussion point.

P21L419: This study was not based on geological models. Therefore, this sentence seems to overestimate the potential of the presented approach which is an automated mesh generation and should be either modified or deleted.

Figure12: Such diagrams are known from well test analysis and should be compared to other analytical and numerical solutions for the case of “one no-flow boundary” as presented for example in: http://oilproduction.net/files/Fekete_WellTestApplications.pdf