

Interactive comment on “Bayesian full-waveform inversion of tube waves to estimate fracture aperture and compliance” by Jürg Hunziker et al.

Anonymous Referee #3

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The authors present a novel approach for Bayesian full-waveform Inversion of VSP tube waves with the aim of estimating fracture aperture and compliance. The manuscript is well written and interesting to read. The choice of the research methodology is appropriate and it supports the research objective. The authors validate the proposed approach using both synthetic and experimental data.

I have a couple of comments and questions:

- Could you please elaborate more on the choice of inversion parameters and their influence on the results, e.g. number of Markov chains, number of runs.
- I understand that the number of fractures is a known parameter. How do you define the total number of fractures for inversion and what is the smallest fracture aperture

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that you can consider?

- It is known that the tube wave reflection and transmission is not only generated through a fracture intersecting a borehole, but it can be also caused by borehole diameter changes (i.e. washouts). Can your inversion algorithm account for this effect?
- I'd suggest to include the synthetic example in the main body rather than in the Appendix. This will improve the readability and understanding of the method.
- The authors state that the inversion results are consistent with the televiewer data and refer to Krietsch et al. (2018) many times. Which figure in Krietsch et al. (2018) is showing the interval selected for the Bayesian inversion? Could you please include it in your manuscript for clarity?
- “The inferred apertures are consistent with televiewer data and the inferred compliances are roughly in the same range as those derived from sonic logs at the same site.” Please be more precise, what are the apertures and compliances values derived from the televiewer data and sonic logs. What is the vertical resolution of the televiewer data?

Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2019-183>, 2019.

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