

Solid Earth Discuss., author comment AC1
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Reply on CC2

Emma A. H. Michie et al.

Author comment on "Fault interpretation uncertainties using seismic data, and the effects on fault seal analysis: a case study from the Horda Platform, with implications for CO₂ storage" by Emma A. H. Michie et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-23-AC1>, 2021

Dear Davide Gamboa,

Thank you for your comments.

Indeed I share your concern about picking at finer scale, and is why I wouldn't suggest to use each and every line available – exactly as you proposed, artifacts are produced associated with human error and triangulation method chosen. If picking on every line is used to create a surface where the method is gridded, which essentially smooths over any irregularity, then a question could be posed as to what is the point in the added extra time to pick on every line if this isn't used when creating the surface. On the other hand, when a triangulation method is used that honours every point every subtle variation between the two adjacent lines (which is very common, and almost unavoidable, due to the scale of seismic resolution) will create a highly irregular fault surface. This is despite any rigorous QC that is done, and is simply a product of human nature, unfortunately. It may seem counter intuitive to suggest not to use every line, particularly when faults are very heterogeneous and irregular in nature, however this is a product of the scale of analysis used in seismic studies. This study attempted to highlight the need to pick according to an 'optimum' strategy, whereby inherent irregularities can still be captured, which are not (or less so) a product of human error or triangulation, but not overly smoothed out when using a very coarse picking strategy.

Yes, that's correct that I used the same equations for the geomechanical models, despite using different software packages (I used T7 – TrapTester). Move uses the same equations as TrapTester. I also performed all the analysis in TrapTester – all picking and then subsequent fault analysis.

My work does indeed resemble that published by Tao and Alves (2019). They produced a nice study showing multiple datasets of varying scales to suggest an optimum line spacing that captures all detail at finer resolution, but without the need to spend time picking at the finest line spacing. This is based on the size of the fault. However, for this case example, their suggested line spacing would be too coarse for detailed fault analyses.

Thanks again for taking the time to read my manuscript and for the comments.

Best Wishes,

Emma Michie