

Interactive comment on “The Impact of Seismic Interpretation Methods on the Analysis of Faults: A Case Study from the Snøhvit Field, Barents Sea” by Jennifer Cunningham et al.

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Dear authors, This a good manuscript that deals with a novel and valid idea; how much detail is required when modelling faults and horizons from 3D seismics. How does one quantify the work involved to get the amount of detail needed to continue into petroleum analysis? I think the whole paper is well written. I have only minor comments, see below.

Yours sincerely, David Tanner

- Does the paper address relevant scientific questions within the scope of SE? *Yes*
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- Does the paper present novel concepts, ideas, tools, or data? *The idea is novel, the data and tools are not.*
- Are substantial conclusions reached? *Yes*
- Are the scientific methods and assumptions valid and clearly outlined? *Yes*
- Are the results sufficient to support the interpretations and conclusions? *Yes*
- Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? *Yes*
- Do the authors give proper credit to related work and clearly indicate their own new/original contribution? *Mostly*
- Does the title clearly reflect the contents of the paper? *Yes*
- Does the abstract provide a concise and complete summary? *Yes*
- Is the overall presentation well structured and clear? *Yes*
- Is the language fluent and precise? *Mostly, see below*
- Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? *Yes*
- Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? *No*
- Are the number and quality of references appropriate? *Yes*
- Is the amount and quality of supplementary material appropriate *NA*

General points:

- (lines 65–78) This part of the introduction needs more workflow references. I would suggest the Fault Analysis Group, Basin Analysis Groups, etc. I do not like to see so much self-citation, especially in the introduction, as can be seen in this part. Please revise.
- (line 174) You use the term ‘manual horizon interpretation techniques’ to include 2D auto-tracking. Please write a sentence on the parameters of the 2D auto-tracking.
- (lines 210-213) What seeding did you use for the 3D-tracking algorithm?
- (lines 165–355) Please transfer any results from the methodology to the results. For instance, time required for the various experiments and methods could be the first part of the results.
- (lines 640–643) You interpret the bulleye patterns as artifacts. This need not be so; they could be real local maxima that occurred due to the coalescence of original faults. Please expand this section, for instance, see Lohr et al. Evolution of a fault surface from 3D attribute analysis and displacement measurements — *J. Struct. Geol.* 2008, doi: 10.1016/jsg.2008.02.099
- (lines 678–683) This might be throwing the baby out with the bathwater! Removing the fault sticks in the middle of the fault might make dynamic modelling of the fault less difficult, but maybe the undulations on the fault are real. Faults may have a large degree of corrugations (in the slip direction), which has been proven to be greater in scale than the seismic resolution (eg. Needham et al. (1996), Resor & Meer (2009), Ziesch et al. (2017)— doi: 10.1111/bre.12146)
- English. I added about 50 commas as I read the manuscript. Commas make the text flow better. Use a comma before ‘respectively’, ‘which’, for instance. On the subject of language; please stick to American English, if that’s what you

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prefer. Be careful of tense in, for instance the introduction [line 97] “Our study will test.”- Our study tests.. [line 100] “We have designed” - We designed. Maybe you should get a native speaker to read the final manuscript.

Minor points:

- (Fig 1) Highlight top Fuglen and top Fruholmen in the stratigraphic column.
- (Fig 2) Add 1, 2, 3, 4 above columns. Then please rewrite the caption.
- (Fig 9) This figure is hard to read as set in the draft manuscript. What are numbers in the graphs? Local maxima?

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