Solid Earth

Discussions

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Interactive comment on "A review and evaluation of the methodology for digitising 2D fracture networks and topographic lineaments in GIS" *by* Romesh Palamakumbura et al.

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Dear reviewer 1, thank you for your time and effort in reviewing our manuscript in open discussion for publication with solid earth. As you accurately pointed out the paper is aimed at a broad range practitioners, beyond the realms of structural geology, particularly as open access GIS software because more accessible. Below we address your various comments regarding clarifying the manuscript. 1) The paper is slanted towards the applied geoscience communities particularly engineering geology community, and focuses on the data collection methodology rather than the sample selection challengers. This is because such challengers relating to sample selection would be

very dependent on the nature of the study untaken, however we agree that useful reference would be beneficial and short sentence eluding to potential challengers in the 'Outcrop image preparation' section. 2) The balance between the benefits of the speed of the method and the potentially accuracy issues is important. This issue is discussed in the Andrews et al., 2019 paper, which is referenced lien 188. We did not feel it was necessary to discuss this further as the approach for limiting this error will be dependent of the type of study undertaken which is beyond the breadth of this paper. 3) This opening sentence is important because it states early outright the broad potential users of this method. 4) Line 11: will correct the font of this line. 5) Line 20-21: The drawbacks of the technique are discussed in detail later on in the text and hence we do not feel it is necessary to do so in the abstract. 6) Line 23-30: This is an important point and needs to be addressed by moving current reference and several additional references to the appropriate parts of the text to show wide variety of applied geoscience studies that could use this methodology. 7) Line 33: We agree with this correction. 8) Line 53-54: This is an important point however, it is beyond the scope of the paper as it related to the understanding of fracture topology, while the point of the paragraph is demonstrate the method aids topology analysis. 9) Line 54: This is an important point and including a reference to the Laubach et al 2019 paper here would be a useful reference for the reader understand the limitations of 2D outcrop based data on understanding connectivity. 10) Line 57: Removing the word 'very' would help sharpen this sentence. 11) Line 59: This is helpful correction and we will move lines 57–58 to the previous paragraph. 12) Line 37-56: This is an important point and we believe would better suited in the pros and cons sections of the paper. A short discussion about not being able to easily gather this type of information digitally and the importance of making these observations while in the field. 13) Line 62: We agree with this comment and would change 'decent' to 'high-quality' 14) Line 75: This is very important point and we would include a short sentence on the importance of selecting an appropriate outcrop for study. This aspect is also discussed in the pro's and con's sections, with digital method allowing the user to select outcrops for analysis

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after fieldwork with the benefits of hindsight. 15) Line 184: Earlier on we state that this method is ideally used in conjunction with such packages. Specifically, DigiFract is not included in this list but this would be a beneficial correction. 16) Line 185: We agree with deleting the term 'detailed' to make the sentence concise. 17) Line 199: We are happy to include the clustering factor here, but this is not a comprehensive list but of potential terms. 18) The common use of 'fracture height' is dependent on the type of study, as with the previous point we are not providing a comprehensive list but a selection of potential derived parameters. 19) Line 202: This is an important clarification and we would make this correction in the paper so that the reader is aware that the type of fractures digitised is dependent on the study and as it maybe worth avoiding certain types of fractures such as anthropogenic fractures and sheet joints that may not be related or affect the processes being studied. 20) Line 217–202: A reference to the Laubach et al., 2019 paper here would provide the reader of sufficient background into these concepts. 21) Line 266–270: The scope of this paper is does not include a review of fracture network understanding and we feel this would be beyond the scope of the paper. We have use the coefficient of variation (Cv) in this case to simply quantitatively demonstrate the difference in clustering between fracture zones and background Peninsular gneiss. 22) Line 268: Correct spelling of 'Odling'. 23) Line 292: We agree with this correction of the positioning of the acronym. 24) Line 301–310: This is a valid point however, the point of the paragraph is to improve the accuracy and consistency of the method commonly used in engineering geology rather than assess the method itself. 25) Line 311–319: This is again a valid point, however these are parameters that are commonly used in engineering geology and it is beyond the scope of the paper to review this. 26) Line 320–322: This is the comparison between the qualitative method after Hoek (1983) and the modified version of this after Sonmez et al. Thus, the idea is that instead of using only subjective decisions about surface quality and fracture system as described by Hoek, the described methodology for digitising 2D fracture networks and topographic lineaments in GIS is useful when using the more quantitave GSI table suggested by Sönmez and Ulusay. 27) Line 361:

We agree with this statement, as we haven't discussed the use of this method at the microscale, we would clarify this statement that the method can be used at the local outcrop and regional DEM scales. 28) Line 366–368: This sentence needs clarifying as we are not stating this method is more accurate than the hand-drawn method, this comparison is discussed earlier particularly in the Andrews et al. (2019) paper but is viable alternative when field time is limited. 29) Finally, a thorough check to make sure the references in the text are mention in the comments will be made.

Interactive comment on Solid Earth Discuss., https://doi.org/10.5194/se-2019-184, 2019.