In this file, there are responses to the Reviewer#2 (Anonymous Referee) and to the Associate Editor.

We thank the Reviewer#2 for the analysis of our responses and additional comments.

We thank the Associate Editor for continuous efforts to secure the reviews and for additional comments.

To better observe communicating our response, we divided our responses into three categories: Agree/Clarification/Disagree.

Responses to the Reviewer#2

1.

Suggestion, Question, or Comment from the Reviewer#2	**Author's Response**	**Change in the Manuscript**
I am generally satisfied with the authors' response. However, I remain concerned about the size and content of the manuscript. Notably, a significant portion of the manuscript consists of reminders from the 2021 paper by Michalak et al. This includes the description of the combinatorial approach, the related algorithm, and the statistical analysis (including the differences between 2D and 3D). The original content of the manuscript is limited to the four mathematical propositions and their proofs (to the authors' credit, this is clearly stated in the introduction). This contribution is interesting but seems relatively brief to justify a standalone publication. I agree with the authors' response that most of the topics proposed in the different reviews for additional discussions (e.g., the effect of normal/reverse faults) would partly change the scope of the paper and that some of these topics are already discussed in	**Clarification** We respectfully emphasize that the original contribution of the manuscript extends beyond the formal mathematical propositions. In particular, we: 1. introduce and analyze the effect of **elevation uncertainty** on the statistical behavior of the method — a feature not present in Michalak et al. (2021). 2. Moreover, we broaden the applicability of the method by discussing its relevance to real-world geoscientific datasets such as **GEBCO bathymetry**, highlighting previously overlooked artifacts (e.g., azimuth clustering). We would also like to note that in the initial review, concerns about the originality or scope of the contribution were not listed among the reviewer's "main concerns", and we addressed all major and detailed points raised at that stage.	None.

the 2021 paper. While I can hardly suggest other propositions, I still believe the paper would truly benefit from some additions…		

2.

Suggestion, Question, or Comment from the Reviewer#2	**Author's Response**	**Change in the Manuscript**
Detailed remarks : - L. 45 : I would remove the sentence "We propose a robust framework for predicting fault geometry in data-limited scenarios" as it could be misleading and interpreted as "the approach described in this paper is new"	**Agree**	Done.

3.

Suggestion, Question, or Comment from the Reviewer#2	**Author's Response**	**Change in the Manuscript**
- Following up the discussion on the introduction of footwall triangles in the statistical analysis (cf. propositions 2 and 4): I agree with the authors that they statistically do not affect the computed mean dip direction (the way it is computed is clearer to me thanks to the authors' response). However, they have an impact on the circular standard error and as such they artificially narrow the N % confidence intervals that are deduced from it (uncertainty quantification, etc.)	**Clarification** In our implementation, **horizontal and vertical triangles are explicitly excluded from the statistical analysis**. Prior to computing directional averages and measures of dispersion, we remove all horizontal and vertical triangles. **As a result, horizontal triangles do not contribute to the denominator in the formula for the sample circular dispersion**, nor do they affect the confidence interval estimates. This filtering is presented in the code attached below. It seems	None.

	that the Referee noticed this effect (in the #4 comment).	

```
29
30      #Combinatorial results
31      surface <- read.table(".txt", header=TRUE, sep = ";", dec=".")
32      nrow(surface)
33
34      surface<-dplyr::filter(surface, DOC<1)#deleting collinear configurations
35      surface<-dplyr::filter(surface, Z_N<1)#deleting horizontal samples
36      surface<-dplyr::filter(surface, Z_N>0)#deleting vertical samples
37      N=nrow(surface)    #number of valid samples
38      N
39
```

4.

Suggestion, Question, or Comment from the Reviewer#2	**Author's Response**	**Change in the Manuscript**
- About Table 1: There is not the same number of observations between Fig.5 (a, c) and (b, d), and between Fig.6 (a, c) and (b, d). I assume that the footwall triangles are added (only) in the (b, d) figures. It could be interesting to also integrate these triangles in the (a, c) figures, so we can compare the impact of elevation errors on the confidence intervals. Maybe having 2 cases for (a, c) figures (with and without these triangles) would be nice, so we can also have a measure of their impact on the confidence intervals.	**Clarification** We would like to clarify that, in all cases, **horizontal triangles are explicitly excluded from the statistical analysis**. Including such triangles would, in fact, be problematic — particularly in the 2D case — since a [0, 0] vector **cannot be assigned a direction**, and therefore cannot be used in directional statistics. We also note what may appear as two opposing ideas in the reviewer's comments: one suggests that horizontal triangles may artificially narrow confidence intervals (which would support their removal), while the other proposes including them in more cases to assess their influence. Given our filtering approach, this issue does not arise in our analysis.	None.

Responses to the Associate Editor

1.

Suggestion, Question, or Comment from the Associate Editor	**Author's Response**	**Change in the Manuscript**
- L. 45 : I would remove the sentence "We propose a robust framework for predicting fault geometry in data-limited scenarios" as it could be misleading and interpreted as "the approach described in this paper is new"	**Agree**	Done.

2.

Suggestion, Question, or Comment from the Associate Editor	**Author's Response**	**Change in the Manuscript**
In addition, there are a few points of clarity that I would like to be addressed: 1. Why is the colormap in Figure 6a and 6b different? Could they be the same?	**Clarification** The difference in colormap arises because panel (b) includes **random elevation perturbations**, whereas panel (a) shows an **idealized configuration with constant elevation steps**. To enhance visual contrast, each panel uses an **independent color scale**, tailored to the actual range of elevation values in that panel. In panel (b), the elevation values — due to added noise — are concentrated near both **the upper and lower ends** of the scale, resulting in stronger color variation. Using a common color scale across both panels would reduce the visibility of these subtle but important differences in elevation distribution	None

3.

Suggestion, Question, or Comment from the Associate Editor	**Author's Response**	**Change in the Manuscript**
2. Line 305 - could we change "We note that we addressed the problem posed by (Michalak et al., 2021) in Discussion: the issue of spatial distribution of points in relation to the boundary of the study area and the fault strike (Figs. 6a, 6b)." to "Previous work identified an issue of the spatial distribution of points in relation to the boundary of the study area and the fault strike (Michalak et al., 2021). However, the work here addressed this problem (Figure 6a, 6b)." Or, could you describe in more detail the issue (and how you have overcome it) rather than referring to the Discussion section of a previous paper.	**Agree**	We revised the manuscript, according to the suggestion.

Other changes:

- We've added the word „horizontal" in Observation 1, because this observation relates to the simplest scenario
- In Part B of Proposition 1, we specified that we mean a 2D variant for the projected vector
- We've applied italics/bold style, where it is required. We've applied vector style (bold and italics) for „edges"