The response to the referees

Comments from referee/editor (black)

Author's response (green)

Associate editor:

In addition to the comments made by the reviewer, please take care of the following points:

- You need to include more of the older literature, particularly in the introduction (e.g., lines 47, 52, 85).

Response #1 >>> Older literature added to the above-mentioned lines in the introduction.

- Methods described in section 3.3. are an integration of 3.1 and 3.2, which is not a separate method.

Response #2 >>> Section 3.3 was excluded, and the content was moved to the end of section 3.2.

- Writing style: do not use pushy words such as "significant, strong, etc." unless you can quantify them. Sentences like "Therefore, the interpolation method must be as detailed and robust as possible, which requires thorough testing and the selection of an approach best suited to the characteristics of the study area" are way too generic and unspecific and should be avoided.

Response #3 >>> Pushy words removed throughout the manuscript

- Figure caption of Fig. 8 is too brief, explain Trace 1 and trace 2 here, too. Add vertical scale to Fig. 9 F.

Response #4 >>> Changed accordingly.

- The conclusions can be much more quantitative.

Response #5 >>> Reduced the discursive tone of the conclusion chapter and rephrased parts to make it more quantitative.

Anonymous Referee #2

The manuscript has improved significantly, particularly through the presentation of methods, structural data description and harmonization of nomenclature using ARSZ (Aura River Shear Zone) and JaSZ (Jaaninoja

Shear Zone) consistently. However, the structure still suffers from repetitiveness, especially between the structural synthesis summary (Section 4.7) and the subsequent discussion (Section 5.2). Although largely corrected, "lidar" still appears in lowercase in some captions (e.g., Fig. 9) and within the text. It must be standardized as LiDAR throughout. In Chapter 3 (Data and Methods), there is a mix of present and past simple. Past tense should be used consistently for specific study actions (e.g., "1185 fracture traces were manually digitised"), while the present tense is reserved for standard procedures. There are recurring missing spaces after citation brackets and between references (e.g., "(Ahlqvist et al., 2026). The paragraphs between lines 47 and 60 can be consolidated. Discussions regarding scalability (Block Theory and fractures) are standard and can be presented more schematically.

Response #6 >>> Further writing inconsistencies fixed. Tense issues in the Method section fixed. Text between lines 47 and 60 made more coherent. Scalability left as is, since we feel it currently serves the purposes of this study and is sufficiently schematic.

There is excessive overlap between sections 4.7 and 5. Section 4.7 repeats descriptions already provided in the T1 and T2 DEM sections. I suggest integrating section 4.7 directly into the partial conclusions of the DEM sections or move interpretative findings entirely into the Discussion (Chapter 5). Descriptions of Riedel patterns and tension fractures are repetitive when compared to Section 4.6.2. The text should be condensed to focus exclusively on kinematic interpretation.

Response #7 >>> Section 4.7 removed, and its content integrated into Sections 4.6 and 5 as suggested. Repetition in Section 5.1 mostly removed as suggested.

Major concerns:
- Section 5.1 and Fig. 12 - Text and figure suggest that the two brittle faults, ARSZ and JaSZ, appear to have developed under different stress orientations (NNW- and NNE-directed stress, respectively), as indicated by the orientation of T-fractures. However, this scenario should be considered unlikely, as faults in close proximity are generally governed by the same far-field stress. Alternative explanations are that either the two faults may have formed at different times, or their different orientations could reflect varying strain responses to a single dominant (likely NNE-directed) paleo-stress. In this last perspective, the shear zones and related fractures might represent multiple Riedel shear zones at different scales. For example, the JaSZ could be seen as a R-fracture within a broader left-lateral shear zone primarily parallel to the ARSZ shear zone.

Response #8 >>> We agree that the stress regime and its correlation with the fracture network and kinematic setting weren’t thoroughly explained and justified previously. The content of Section 5.1 has been edited, and the explanation of the fracture network and kinematic setting has now been clarified. Supportive background literature has also been added.

- Line 390 - It's not clear to me. I only see one stage depicted in Figure 12. In the preceding paragraph, you determined the stress orientation from the fracture networks of the two shear zones. According to this reasoning, how can the same pattern of the two faults align with both NNE- and NNW-oriented stress initially, but only with NNE-oriented stress later? I still propose that the fracture network was generated under a single paleostress far field from the beginning.

Response #9 >>> See Response #8

- Section 5.2 - I recommend condensing the concepts in this chapter and also highlight that the depression appears to follow the main ENE-oriented faults (like the T or Riedel fractures) as expected when viewed on a map.

Response #10 >>> Concept part condensed as suggested