Dear Editor, Frank Zwaan,

Thank you very much for your time and effort to review our manuscript. We appreciate your comments and feedback. We considered all points, and have addressed most of these. In some cases, we may be of a different opinion than suggested in the reviews, but we have carefully addressed and attempted to justify why we are of a difference in opinion. One such specific case is in showing models in 3D. This study focuses on the magnetic fabric and we would highlight the results and observation of it. Additional images from the models would not give additional information. However, we added some more information about the modelling, adapted suggested improvements of the manuscript, and modified certain figures.

Please note that due to the great number of minor comments from you and the reviewers changed certain sections in the discussion. We had modified and added (where needed) wording for clarification, added additional figures (Fig. 6 in manuscript and Fig. S3 in Supplement) for clearer visualisation of magnetic fabric change with the different stages of modelling. Additional changes can be found in the revised manuscript that includes track-changing. Please, find attached our reply to your comments in the attached document.

Again, we would like to thank you. Please do not hesitate to reach out to us for further clarification in any of the responses given after your insightful revision.

Best regards and on behalf of my co-authors,

Thorben Schöfisch

RC1: 'Comment on egusphere-2022-1258', Michele Cooke

Dear Michele Cooke,

Thank you very much for your time and effort to comment our manuscript. We appreciate your comments and feedback. We considered all given points, modified the text in the manuscript based on the comments, and provide a reasoning to each point in our reply.

Please do not hesitate to reach out to us for further clarification in any of the responses given after your insightful revision.

Best regards and on behalf of my co-authors,

Thorben Schöfisch

1. The introduction could benefit from some description of the mechanisms that produce the detected magnetic fabric. Are the magnetic grain not equant? The discussion mentions grain rotation but this not explained in the introduction. Presumably, if the grains are equant they would not have consistent rotation. Does the degree of rotation depend on the aspect ratio of the magnetic grains (e.g., Tickoff and Markley 2002)? How does the sensitivity of magnetic fabric development within dry sand with increasing strain scale to the development of crustal magnetic fabrics with strain? While some of this background may in earlier papers of the authors some overview of the mechanism s that produce magnetic fabric in the sandbox will be very helpful.
   - The introduction ends with the statement that sandbox models simulate grain rotation only. However, we highlighted this statement by an additional sentence making this point clearer. Moreover, we added a description of the mechanism in the discussion in section 4.2. This suggestion was made by another reviewer, C. García-Lasanta. In the discussion we provide more background about the mechanism that develops the magnetic fabric, which is grain rotation only in the sandbox models. The magnetic grains and the used material are not equant. The shape of the grains is angular to subangular. How such grain shape is sensitive to strain, is also a point of discussion that was aimed to be understood by this study. Consequently, more background of the mechanism that influences the magnetic fabric development in models is a result and discussed by this study.

2. Following from the previous point, the developing of initial fabric from sieving should be explained in the methods section so that we can better appreciate the results. I thought that the stereonets were showing a deformation fabric so when I

read that it was from sieving in the discussion section, I had to go back and reread the results to modify my understanding. I appreciate that the paper carefully distinguished between the presentation of the results in section 3 and interpretation of these results in the discussion. This does require that the reader needs to be guided a bit more in the to connect interpretations to the relevant results without becoming confused within the data presentation. I bring this up for the seiving induced fabrics but other interpretations in the discussion could also benefit from connections with specific observations within the figures.

- The third sentence in the result section explains the initial fabric and that it is created by sieving. Creating an initial fabric by sieving is tested in the study. Consequently, the observations are a new results/outcome created by this study and therefore we have chosen not to make this part of the method section.

Other magnetic fabrics (principal axis orientations, degree and shape of anisotropy) are also described in the results section. The relation between the fabrics and changes from the initial fabric related to strain are compared and discussed in the discussion. However, we added some wording in the discussion for a clearer connection between results and interpretations. Moreover, we modified Fig. 3 (see following comment) and introduced a new figure (Fig. 6) for better comparison between the magnetic fabric from same structures but different models. Such clarification and the new figures support the connection between specific observations and interpretations.

3. What is the uncertainty of the AMS measurements? Can this uncertainty be conveyed on the stereonets and on Figure 3? The degree of anisotropy data (Pf) is quite variable and it would be helpful to see how much of this variation is within or outside of the measurement uncertainty. Furthermore, it may be helpful to present figure 3 as a ‘violin’ plot rather than as a scatter plot. This can highlight the differences of anisotropy between the experiments. Also, with the violin plots you will be able to quantify the differences among the different types of data.

- The uncertainty of AMS measurements is is very small (signal sensitivity is $2x10^{-8}$ SI, which is several orders of magnitude smaller than the measured signal of samples in the study). Moreover, the uncertainty is given by the confidence ellipses in the stereonets. Here, the confidence ellipses are very narrow and additionally, very high F-values (data table in supplement) show that there is generally a very low uncertainty in the measurement of anisotropy. Also, the magnetic signal is determined strongly by the artificial high content of ferromagnetic magnetite. Magnetite dominates the bulk susceptibility of an AMS sample in the model, therefore high F-values.

Generally, the large dataset provides a great statistical basis for observations and interpretations for each area. Outliers are averaged out by the amount of data taken in the models. Such scattering of data, as observed in the figures of this study, are typical for AMS studies. Moreover, the large dataset averages out also minor variations of sampling the models (minor deviations from perfect oriented sampling) as well as by handling the samples during adjusting the samples in the instrument for measuring.

We added a description of uncertainty in the method section (2.1.4). Also, we added some additional figures in the discussion section and Supplement, showing the confidence ellipses and their values.

Moreover, instead of using violin plots, we used raincloud plots (see modified Fig. 3). Raincloud plots have the advantage of showing the raw data and its distribution by "half-violins". However, the given plots in Figure 3 have the advantage, that they introduce additional dimensions of the dataset. They show a relation and therefore, potential gradients with distance to the thrust/fault of the degree of anisotropy. On the one hand, they show different ranges of the degree of anisotropy between the different structures, but on the other hand they also show the relation and change of degree of anisotropy with each other.

4. The paper is very careful to distinguish between the presentation of the results in section 3 and interpretation of these results in the discussion. This does require that the reader needs to be guided a bit more in the discussion to connect interpretations tot the relevant results.
    - See answer to comment 2. We added additional wording throughout the discussion section, modified figure 3, and added an additional figure for better comparison and, following, improved understanding of our interpretations.

5. The lack of pervasive extensional fabric is likely a consequence of the granular analog material that has very low cohesion. This point should be made in section 4.2.
   - A similar point was made in section 5.2., but we added this statement now to 4.2 as well.

6. The development of faults in granular material involves dilation as grains move past one another. The dilation along the normal faults is likely the reason that these zones are sensitive to compaction and magnetic fabric realignment during later contraction. Mentioning the dilation along faults in section 4.3.3 (around line 341) can help with the interpretation of the results.
   - We added this point in the section 4.2, where we explain the development of the magnetic fabric at the normal faults of Model I. In this section, we added also few words that relate grain rotation with magnetic fabric development.

Specific suggestions/comments.

- Old Line 19/new 20: "further towards" reads awkwardly. Do you mean 'further away from' or 'closer towards'?
    - We replaced the word "towards" with "into", as the fabric modifies "further into…" the interpreted fabric.
- Line 12/ new 26: The 'however' is not needed because the previous sentence and this sentence are both valid. The word 'however' implies that one sentence contradicts the other.
    - Line 26: We removed the word 'however'.
- Line 58/ new 60: "… crustal magnetic fabric .."
  - We added the addition "as observed in crustal tectonic settings" to the magnetic fabric, to be more specific.

- Line 100/ new 106: This text can be revised to clearly present that both models 2 and 3 were extended 1 cm before inversion. At least that is my understanding from other parts of the paper – it wasn't clear here.
    - All three models were extended by 1 cm, this is given in line 100 (previous line 95). We removed the specific number of "1 cm" in line 106 to reduce potential confusion.
- Line 122/ new 128: this is a nice framed caveat about the fault fabrics.
    - This statement in line 130 is an additional explanation of the scattering of the data, but doesn´t explain the scattering of the data by itself. We find it important to mention, but not as important to include it in the main manuscript. Additional information were/are given in the supplementary material and a not reserved from the reader.
- Lines 133 and 135/ / new 140 and 144:. For clarity equations should have their own lines and numbering
    - Each equation received their own line and numbering.

- Line 157-8// new 183ff: I found this sentence confusing. The concepts/observations need more explanation.
    - We added an explanation for clarification.
- line 195/ new 233: What specifically should I be comparing from figure 4 and 2 to see that the normal fault fabric is less pronounced? The confidence contours seem pretty similar. Or am I supposed to have seen this difference in figure 3? The range of Pj with x (normal faults) seems similar for the three models. Similarly, I'm not sure that I see the stronger fabric of the thrust faults in figure 3 (range of Pf seems similar) or in the difference between figures2 and figures 4/5. Being new to looking at this type of data, I could benefit from some more guidance on what particular aspects of the data indicate more pervasive fabric.
    - The ranges of Pj of the normal faults are similar, true, but here we refer to the "minor" differences in the principal axes distribution. The confidence ellipses of the normal faults differ as they are narrower in Fig. 4 and not as elongated/stretched as in Fig. 2. Consequently, the principal axes distribution is more clustered in Fig. 4. Moreover, the difference to the thrust faults lies in the alignment of the magnetic foliation (kmax-kint-distribution), which is oblique to the normal-fault-surface and parallel to subparallel for the thrust-fault-surface. We added some clarification to the text and an additional Figures (Fig 6 and Fig. S3 in Supplement) for better visualization.

- Line 260/ new 312ff: Explain that the basal plate moves so that the sandpack in the other hanging wall lies over the stationary base and might not experience as much vibrations.
    - We added such explanation.

- Line 278-9/ new 339: awkward unclear wording
    - We improved the sentence structure and divided the statement into two sentences.

- Line 291-2/ new 382f: The parenthetic of initial to thrusting via penetrative strain induced fabric is awkward. This idea can be more clear if presented in a second paragraph.
    - This idea in parenthesis is a reminder for the general concept/evolution of magnetic fabric with increasing strain. This evolution is observed in the models of this study as well, which is stated in this sentence.
      We find it useful to leave it here, as additional explanation. Starting a new paragraph would not bring a new argument or addition.
- Line 320/ new 415 Awkward phrasing.
    - Modified in text.
- Line 332/ new 431: monitored is probably not the word you want. Maybe 'detected' is better.
    - We changed the wording here.
- Line 337/ new 437: awkward phrasing
    - Modified in text.
- Line 347-348/ new 447f. Awkward sentence that needs to be revised.
    - Modified in text

References

Markley, M.J. and Tikoff, B., 2002. Matchsticks on parade: Vertical axis rotation in oblique divergence. Journal of Geophysical Research: Solid Earth, 107(B12), pp.ETG-9.

-Michele Cooke

Amherst, MA USA

RC2: 'Comment on egusphere-2022-1258', Kenneth Kodama, 06 Feb 2023 reply

This is a well-written, well-organized manuscript about interesting sand box experiments modeling the effects of extension and the compression on a loose sand/magnetite mixture. The strain caused by normal and thrust faulting is monitored by AMS measurements. The experiments are well-thought out, carefully conducted and carefully sampled. The major "take-aways" are that extension does not cause far-field penetrative strain in the models, whereas compression does cause far-field penetrative strain, as well as thrust faulting. This makes intuitive sense based on the loose sand/magnetite mixture used in the models.

My only suggestion is to clarify the orientation of the stereonets with respect to the layering in the model in section 2.1.2. I was able to figure out that the outer circle of the stereonets was parallel to the layering in the models, but that wasn't clear to me on just reading section 2.1.2.

I would support publication of this manuscript nearly as is (with the exception of my preceding short comment).

Dear Kenneth Kodama,

Thank you very much for your time and interest in this manuscript. We appreciate your comment and clarified the given point in the text. We added now a clarification in section 2.1.3 (around line 138f in track-changed manuscript), where the orientation of the stereonets were described in relation to the backstop of the model. We added a line saying that the outer circle of the stereonets (called primitive circle) is parallel to the initial horizontal layering of the models.

Please do not hesitate to reach out to us for further clarification in any of the responses given after your insightful revision.

Best regards and on behalf of my co-authors,

Thorben Schöfisch

RC3: 'Comment on egusphere-2022-1258', Cristina García-Lasanta,

This work presents a very interesting approach to use tectonic analog models (that allow simplifying natural variables) to assess the AMS resulting from the controlled strain applied to them. The analog material used seems a good magnetic fabric recorder and seems simple, which makes it efficient from a technical point of view (likely even easier than other analog materials tested for AMS by other authors) so more series of analog models can be investigated using it in the future. The results descriptions are detailed and well organized, and I think the paper overall has a robust quality, is of great interest for the scientific community, and should be ready for acceptance in this special volume just after authors can consider some minor comments and additions that hopefully would help enrich the discussion. It will be great to read the next steps of this project in the near future and the potential advances it may bring in the applications of magnetic fabrics to understand tectonic deformation.

Dear Cristina García-Lasanta,

Thank you very much for your time and great effort to comment our manuscript. We appreciate your great comments and feedback. We considered all given points, reviewed the text in the manuscript based on your comments, and provide a reasoning to each point in our reply.

Please do not hesitate to reach out to us for further clarification in any of the responses given after your insightful revision.

Best regards and on behalf of my co-authors,

Thorben Schöfisch

Specific comments

1. The references mentioned in the intro about magnetic lineation orientations in extensional settings (Marcén et al 2019 and Cifelli et al 2005) differ in terms of the degree of deformation affecting the rocks they studied (and in the distance to major brittle structures), and these differences may be the reason why the orientation of magnetic lineation with respect to the maximum stretch is different in each case. I think this should be explained briefly in your intro to support your discussion later about how the magnetic lineation orientations from your models are interpreted with respect to extension.
   - We rephrased the sentences and clarified the problem with the references.

2. Some magnetic characterization of the analog material would be a great addition. The paper is well understood without it, but since the material was developed exclusively for your experimentations, I think it would be beneficial to support its relative concentration of magnetite vs quartz sand with the bulk magnetic susceptibility ranges it present, to illustrate that the ferromagnetic signal dominates the magnetic susceptibility over the diamagnetic fraction. Expected limitations of using a non-cohesive material in these analog models could also be explained here.
   - We added the average bulk susceptibility in the text, which is on average ~1.9xE-3 SI. This high number of susceptibility indicates that the AMS signal is governed by the ferromagnetic content in the mixture. Moreover, limitations of using the non-cohesive material are addressed in the discussion section 4.2.

3. I found the paragraph from lines 107 to 114 (new lines 111 ff) slightly difficult to follow. I think reorganizing it so the model cutting description and the AMS sampling description are differentiated along the paragraph would simplify the reading. Also, please mention how the AMS cubes were oriented with respect to the model backstop (it is evident later, but it would be great to have this information from your methods).

   - We added the orientation with respect to the model backstop in this referred section 2.1.2. Also, we restructured this paragraph for better understanding.

4. During sections 3 and 4, you mentioned that the initial fabric is originated by sieving the sand when the models were prepared. I think it would be simpler (and technically more appropriate maybe?) to explain that the mechanism related to the development of this primary fabric is the sand deposit. The sieving process itself is meant to remove the cohesion in the sand, but the mechanism itself is the deposit/sedimentation of the particles. Then you could focus on explaining the difference between that simple sedimentary/depositional fabric and the modified fabric you got in previous studies where the sand layers were scraped (a deformation was applied doing that).
   - In most cases throughout the text, we refer to the initial fabric as reference fabric. In some places, e.g., at the beginning of the result section or discussion section, we state that the initial fabric is created by sieving, which in fact is the method that deposits the sand. However, as this special issue summarizes advances in analogue modelling, we want to highlight the preparation technique and its importance to influence the magnetic fabric. To underline the difference to another model preparation technique, which is scraping/pouring material into the sandbox, we want the clarify the distinction between the preparation techniques and their influence on creating the initial magnetic fabric. Therefore, we use "sieving" for clarification.

5. In figures 2, 4 and 5, a subtle magnetic lineation with E-W orientation can be observed also in the footwall areas (outside of the graben in Model I and on the thrusts' footwalls in both other models). I think it would help to mention this on your descriptions to later support your discussion about implications with respect to the strain registered (like your sentences starting from line 256/ new 320). It is relevant to explain that the tectonic fabric imprint seems less pervasive in the footwalls, so illustrating scattering/clustering magnitudes in each area mentioning the specific confidence angles of kmax and kint in each case may be helpful.

- We added this observation of the subtle magnetic lineation to the result section, where it was missing before. Moreover, we referenced this observation in the discussion section and added additional plots (Fig. 6 and S3 in Supplement) that show the confidence ellipses only for the same structures of the different models. Also, we added the specific angles to the plot for comparison.

6. I think figure 3 has a great value for the paper, however, due to the general scattering of Pj values (and the large amount of data you collected!), some of the different degrees of anisotropy in different areas of the models explained on the text are not easy to visualize in the figure. To make those differences more evident for your readers, I suggest you can include on the text average Pj values (and their ranges) for each area.
   - We added the ranges of Pj values for each structure in the text, in the result section. Moreover, we created a density distribution plot, showing the mean distribution of Pj for each structure in comparison (see modified Fig. 3).

7. Section 4.2 is very useful and very well explained, in my opinion. I'd suggest this could be the place to add a brief mention about the potential role of your non-cohesive sand in the way strain was recorded (like extension was mainly recorded by magnetic fabric close to the brittle structures and not parallel to the maximum stretch as it often happens in other natural extensional basins, where rocks have cohesion). Also, maybe some words about the mechanisms that could govern the development of these magnetic fabrics (physical rotation of grains? Other interesting factors?)
   - We added an explanation that emphasis the mechanism (i.e., grain rotation) and influence on the development of the observed magnetic fabric in the models in section 4.2. Additionally, we referred and linked to grain rotation in other parts of the discussion section, where we discuss each magnetic fabric at each structure.

8. I think sections 4.3.2 and 4.3.3 would improve with some rewording and small changes. It is discussed how pre-existing extensional fractures on your models may be accommodating part of the strain associated to inversion as they record layer parallel shortening (your section 4.3.2). But the mechanisms associated are not discussed (related maybe to subtle volume changes of localized grains? Rotation/re-rotation of grains?) and I think adding some hypotheses about them would help (as I suggested just above that you could do about extensional-related fabrics). Instead, some parts of these sections seem to point to a reactivation of the pre-existing extensional faults to accommodate the shortening but I think that sounds slightly contradictory. The pre-existence of fractures that can change the materials rheology may be more important in natural settings or in inversion analogs that use cohesive materials such as clays (like those used by Eisenstadt and Withjack, 1995 that you cite) or combined brittle and ductile layers (like in Bonini et al 2012), but it may not be a decisive factor for your non-cohesive pack of sand. And kinematic reactivation of the pre-existing extensional fractures is not evident in your models II and III. Lines 339 to 348 discuss

that the pre-existing faults become steeper with inversion, but this seems mainly due to their passive rotation as the pack of sand is compressed and accommodated the LPS, but not to the reactivation of the previous fault planes to accommodate shortening. As I mentioned above, I think this part should be reviewed to discuss the factors above and mainly to avoid that some sentences may sound opposite around both subsections or with respect to the models' limitations discussed in section 5.2 (which I think is a very clear and complete section).
- We reworded specific addressed statements and reviewed the part.

Technical comments

Graphical abstract: You could use a similar style for the arrows to the right (backstop) marking extension/compression as you used in Fig 1, to avoid confusing these with shear symbols. It may also help to label the backstop position with respect to the stereonets orientation and to represent on this sketch (and following figures) the relative 'north' you mention along the paper. Also please mark the backstop position on the stereonets here (you did it on the other figures of the paper and it is extremely helpful).
- We modified the graphical abstract. We added some marks and labels on the stereonet, modified some colours and the arrows for extension and shortening.

Line 69/ new 73: Add 'the' before 'model'
- Added.

Line 107/ new 110: Is it 'sides' instead of 'sites'?
- Modified in text.

Line 130/ new 137: Replace 'describe' with 'describes'. Delete 'an'
- Modified in text.

Line 150/ new 174: Maybe you could say 'center of the graben' instead of 'hanging-wall of the graben'?
- Modified in text.

Lines 155-159/ new 180ff: I found these lines slightly confusing to follow. The magnetic foliation doesn't look parallel to the fault surfaces in these two cases. Both planes (magnetic foliation and fault plane) have the same dip direction, but their dip angles are oblique between them, around 50 degrees according to the stereonets in fig 2. Could you rephrase these lines to clarify the description?
- We rephrased the text here.

Figure 2: Notice there is a typo with the fault blocks labels, they should be labelled as footwalls instead of hanging walls A and B.
- Corrected in figure.

Figure 3 (Do you mean Figs 4 and 5?): It may help that you explain that hanging and footwalls here refer to the reverse faults (so there is no confusion about what block you are located with respect to the pre-inversion normal faults).
- We added a clarification in the result section in section 3.2 and later 3.3, where the different parts (hanging wall and footwall) become important.

Line 184/ new 214ff: According to your following descriptions, these faults steepened during inversion, also according to figure S1. Please clarify this here.

- We added the wording "during inversion", but we actually do not know what to clarify here. It is described, that with the onset of model shortening (i.e., model inversion), the faults steepen.

Line 192/ new 230: Maybe replacing 'scatter' with 'distribution'? Or it may be more visual to refer it as 'cluster' considering the kmin axes degree of grouping.

- Modified in text.

Lines 194-195 / new 231f: Would help adding that kmin axes are tilted opposite to the dip direction of the fault surfaces. I'm not sure I understand what 'less pronounced' means here, could this be clarified?

- Modified in text. "less pronounced" means in this sense, that the confidence ellipses are narrower and more clustered; they do not overlap and do not create a well-defined magnetic foliation.

Lines 218-221/ new 253ff: This sounds great, they are the comments I was referring to for line 184. You could refer to figure S1 here, it is very illustrative to understand the graben geometry evolution during inversion.

- A similar description as made here was made in the lines 184. Also, Fig. S1 (Supplement) is referred in both cases.

Line 228 / new 273f: Suggest adding '(Figure 5)' after "Model III', and in the following line refer to figure 4

- Modified in text. With the new Fig. 6, such described comparison in these lines are more obvious in the new figure.

Line 230/ new 275f: It may be useful to mention the dip direction of both structures

- Added in text.

Line 235/ new 283f: I'd suggest describing these as 'very oblique' (around 50-60 degrees between both the fault plane and the foliation plane) instead of 'subparallel'. Please check the comment about lines 155-159.

- Rephrased in text.

Lines 255-256/ new 305f: This conclusion should be supported with the specific confidence angles values of kmax and kmin in the samples from both footwalls.

- We added additional figures (Fig. 6 and S3 in Supplement) to support this conclusion, also for improved visualisation and comparison of the fabric. We added as well the confidence angles in these new figures.

Line 260/ new 311ff: Could you discuss the potential sources of particles 'vibrations'?

- Added to text. The vibration was due to a space between the metal plate and the table during modelling, which was removed during preparation of models II and III.

Lines 262-263/ new 322f: Replace 'Olivia' with 'Oliva'. Add 'et al.' to 'García-Lasanta et al., 2018'

- We are deeply sorry for these typos and apologize for our negligence here.

Line 301/ new 392ff: Do you mean it may be an artifact of the number of samples collected in these areas? If not, please explain.

- We removed text for clarification. A similar clarification is given in the method section. The artefact is due to the sample-size to structure ratio and explained in the new section about uncertainties in AMS measurements.

Lines 310-311/ new 405 (and again line 323/ new 420): It seems you refer to horizontal contraction/compression rather than vertical compaction. This is what I understood considering that you mention the development of LPS prior to the brittle structures' inception. Could you rephrase this sentence to avoid confusions?

- We clarified the text, here and in the following lines.

Line 337/ new 436ff: This expression sounds a bit confusing to me, could you clarify the sentence? What do you refer as 'imbricates'?

- We restructured and clarified the sentence.

Line 367/ new 467: AMS from all faults show a lower Pj on inverted models? Only around normal faults? Only around thrusts?

- Here, we referred to an observation from a previous study. We clarified in in the text. However, the referred gradient in Pj is discussed later in this paragraph.

Line 368/ new 470: 'extensional settings'

- Modified in text.

Line 370/ new 471: Looks this may be Figure 3

- Corrected in text.

Line 375/ new 473: I could not find a reference V1-2 in your S1, could you double-check this? – These videos will appear in as supplement.

Line 378/ new 480: Do you mean normal faults in Model I?

- We clarified the statements in this line. Here, we refer to general trends throughout the complete models.

Line 380/ new 484: 'the change in magnetic fabric with distance', do you refer to change in the geometry of the magnetic ellipsoids or to change in the magnetic axes orientation, or both?

- Both, we clarified it in the text.

Lines 401-402/ new 507ff: I am confused by 'In addition, an extensional fabric is not displayed in these models.' Along the paper (and again in line 413), my understanding was that you were describing an incipient extension-related magnetic fabric nearby (or in) the normal fault planes, but this sentence seems to point otherwise. I think this section would benefit from some rewording, or otherwise some additions should be explained on the previous sections to avoid confusions.

- Here, we refer to the extensional fabric that is created away from normal faulting, as observed in nature. This fabric couldn´t be reproduced by this study. We clarified it now in this paragraph.

Line 414/ new 521: Preferably replace ‘compaction’ with ‘shortening’

- Modified in text.

Line 423-424/ new 531: Add ‘the‘ before ‘deformation pattern’. Add an ‘s’ to ‘shows’

- Modified in text.

Line 419/ new 527f: I think the term ‘deform’ should be replaced by ‘passively rotate’ to avoid the confusion with the idea that the normal faults may have reactivated during the pop-up development.

- Modified in text.

S2 caption: It seems that the red color indicates a sample containing more percentage of material directly affected by a brittle structure, but line 80 says otherwise, please clarify. You can also indicate that the orange lines in each plot represent the fault planes.

- No, the yellow/whitish coloured samples contain more amount of the structure than the red one. We changed this figure completely for a better understanding.