Reviewer #2 line-by-line Comments

Line 9 - What important implications? Does it increase or decrease permeability and how does this affect metamorphism and rheology. *Edited to clarify that coseismic damage INCREASES wall rock permeability, enhances subsequence fluid-driven reactions and transforms rock rheology.*

Line 31 - Need to mention nucleation in here. Menegon et al show that the fracturing drives nucleation of new grains. It's a bit more informative than 'recrystallisation'. *Added.*

Line 34 - Where does annealing fit into the scheme of modification processes? You haven't mentioned annealing before. *Changed "annealing" to "recrystallization".*

Line 46 - How are they beneficial? I assume this is the reason that you are doing this work so please explain more fully. *They are beneficial in extracting rupture and melting properties of seismic faults, as the conclusion of the manuscript shows. This is stated in the original manuscript and it is not clear as to what the reviewer wants to be explained more fully.*

Line 51 - ...to observe and presumably measure the chemical composition? *The EDX detector on the TEM cannot perform quantitative chemical measurements of the plagioclase.*

Line 58 - Pseudotachylytes are characterised by melt. Can you link the mineralogy within the veins to the conditions of melting as opposed to subesquent recrystallisation at higher metamorphic grade conditions? *Not necessarily. We interpret the mineralogy of the pseudotachylytes to be a result of recrystallization after quenching of the melt.*

Line 69 - I am not sure on the strict definition of microfracture but they usually occur as discrete fractures within the grains rather than zones with a width of several 10s microns. Consider another term rather than microfracture here. *Unless the Reviewer has a suggestion for another term, we are not sure what else to call them. They are not micro-shear zones as they don't display significant shear strain. They are elongated (most likely planar) zones of crushed and fragmented plagioclase. Microfracture 2 (MF2) displays branching asymmetrical fractures which is characteristic of a brittle rupture. We believe microfracture is the best term for these features.*

Line 70 - Figure 2 does not demonstrate that the grains have a CPO. *Figure 2 has been revised.*

Line 71 - Is the pseudotachylyte wall parallel to the margin of the fine grained feldspars zone? Figure 2a shows the SPO cross cutting the 'microfracture'. You need to relate these features to the pseudotachylye. *Figure 1 clearly shows the relationship between the orientation of the microfractures and that of the pseudotachylyte. The SPO insets of Figure 2 also contain the orientation of the elongation of the grains relative to the pseudotachylyte.*

Line 88 - What is this reference and how do these authors relate to your data? *Aupart et al. (2018) was included in the reference list and a new figure of plagioclase grain size distribution from their work was added.*

Line 95 - What is the activation volume of the X-rays for this technique given the conditions used? Most microprobe analyses will have a micro-scale resolution which is the scale of most of your grains. What standards were used? *All information concerning microprobe analyses are now included in the revised manuscript.*

Line 104 - Please provide more details on the mass balance calculations or consider uploading the script used in Matlab. Did you correct for density/molar volume of different phases? *The mass balance methods were expanded.*

Line 107 - If the dislocations are in a subgrain wall then they are not 'littered' about. Consider rephrasing. *The term "littered" was removed and the sentence was edited.*

Line 111 - K-feldspar with an homogenous composition. *Edited.*

Line 114 - Can you show numerically that the K-feldspar has a statistically significantly greater proportion of grain boundaries compared to the other phases or to what you would expect given the volume analysed? *Our observation that there are more grain boundaries than phase boundaries is purely qualitative based on the TEM scan. It is clear the K-feldspar grains are clustered together. Any statistical analysis would require EBSD which is only in the early stages of development for such small scales. We agree this would be interesting and enrich our results but it is beyond the scope of the current manuscript.*

Line 116 - How robust is that obervation beyond the two domains highlighted in figure 5b? The Ca-rich area on the right hand side of Figure 5b seems to have no lamellae in figure 5a. *It is correct that not all Ca-rich domains are associated with lamella. But all lamella are associated with a Ca-rich domain. This could be a result of the orientation of the FIB foil, with the lamellae only visible in some orientations. We have edited the sentence to include clarify the "local" nature of the association.*

Line 122 - But the host is not within this compositional range (An 40 stated above). So you wouldn't expect exsolution. *Yes that is right and we have edited our interpretations to match with Reviewer #2's argument of lamella formation as discussed in our response.*

Line 141 - Figure 3 is not relevant here. *The reference to Fig. 3 was removed.*

Line 207 - Not referenced. *Aupart et al. (2018) is included in our reference list.*