Review of "Integrating field, textural and geochemical monitoring to track eruption triggers and dynamics: a case-study from Piton de la Fournaise" by Gurioli et al., submitted to Solid Earth Discussions

General comments:

This manuscript presents new data on the textural and geochemical analyses of pyroclasts from the 2014 eruption at Piton de la Fournaise (PdF), la Reunion. Using various sampling and measuring techniques, the authors determined a chronology of the eruption events, morphology, grain size and microtexture of pyroclasts, and petrology and geochemistry of the bulk rock, glass, crystal and the melt inclusions. Based on small precursory activity and the analyses in this study, the authors suggest that the eruption was triggered by pressurization due to bubble accumulation in a shallow magma reservoir, as opposed to magma chamber cooling or a new batch of magma flux into the reservoir

This study includes a very thorough physicochemical analysis of pyroclasts from PdF, which is worth publishing after revising the comments mentioned here, which are mainly related to the discussion or implication sections of the manuscript. In general, the outcomes of this study are not transparent with regards to the questions addressed in Lines 99-105. It seems that the paper includes a number of hypotheses while the validity of those are inadequately presented. I suggest either rephrasing parts of the manuscript as applicable or provide some quantitative analysis in support of some of the conclusions. Also, I find a number of parameters in the figures are not defined properly in the text or in figure captions, making it difficult to follow at places. I hope the authors will find the following specific comments useful for further improvements.

Specific comments:

Lines 801-807: Following my general remark, several possible scenarios have been proposed here without a reasonable justification. For example, "we found that this kind of eruption can be triggered solely by bubble accumulation and source pressurization" – The relationship of bubbles, pressure build-up and its extent for eruption triggering have not been demonstrated in this study.

Lines 798-799: It seems like the hypotheses of a shallow magma reservoir and its pressurization are mostly driven by the weak and short geophysical precursors, which is not the focus of this study. In other words, the contribution of geochemical/petrological monitoring independent of geophysical signals – for tracking eruption triggers and dynamics are not transparent.

Title: The title is too broad. Although it is catchy, but based on the previous two comments, neither the trigger nor the dynamics are adequately addressed in this study.

Lines 636-640 and 683-689: Isolated vesicles, also mentioned in some other parts of the manuscript, could simply be a result of post-coalescence surface tension forces, especially for low viscosity magmas due to relatively smaller viscous forces. Therefore it may not represent the low rate of deformation, and can even get overprinted during cooling of the pyroclasts. On the other hand, the presence of micro-crystals increase viscosity preserving the coalesced textures (see Moitra et al. 2013, Relating vesicle shapes in pyroclasts to eruption styles, Bull Volc, for a discussion), and therefore if syneruptive, it may not represent cooled magma and longer residence times. Therefore the implications/conclusions need to be more convincing, or a discussion on the various possibilities is required, also insightful, at the least.

Figure 5c: There is no discussion on circularity? What about any other shape factor? What do they mean?

Figure 6d: There are a number of solid lines drawn without a proper caption. Which diagonal line (and therefore the samples) represents equality and what are those various percentages?

Technical corrections:

Line 75: space between grain and size
Line 81: weird spacing
Line 189: Mm^3 could be defined in line 188, where million m^3 is first introduced, for better clarity.
Figure 1c caption: locations instead of location
Figure 4 caption: %cry and not %Cry to be consistent
Figure 9 – 'T' in FeOT should be in subscript
- The name/expression "Piton de la Fournaise" is not consistent in the manuscript: 'La' is often used instead of 'la'
- Figure subplots are sometimes labeled by capital letters, sometimes by small letters