The referee comment to the manuscript "Ca-rich garnets and associated symplectites in mafic peraluminous granulites from the Gföhl Nappe System, Austria" by authors Konstantin Petrakakis et al.

Genral Comments:

The reviewed manuscript "Ca-rich garnets and associated symplectites in mafic peraluminous granulites from the Gföhl Nappe System, Austria" by authors Konstantin Petrakakis et al. represents a very detailed and focussed study of processes recorded in mafic granulites from Bohemian Massif mainly as a complex zoning of garnets.

The work is of a particular interest from both the more regional point of view, but mainly for a broader audience due to its quite unconventional approach, which seems to be quite appropriate for a study of such peculiar lithologies. The manuscript fits well within the scope of SE, is contains large set of new data and includes novel approach for estimates on metamorphic history of high-grade rocks. The conclusions are reached by relevant and clearly outlined methods and are fully justified. The methods are described and explained in detail allowing anybody to reproduce them. The substantial part of the manuscript is new authors contribution, while any references to previous works of other authors are properly cited. The title is relevant to the manuscript content, abstract summarizes the most important information reached by the work. The presentation is generally well structured, except of some minor flaws in the descriptive part making it a bit hard to follow (see specific comments). The language is fluent without any obvious mistakes (as far as I can recognize not being native speaker). Symbols and abbreviations are properly defined and used, references and supplementary material are appropriate. There are only several rather minor issues mostly of formal character, where I would recommend to make some changes in structure of some figures and text - mainly descriptive part. Also, I have few comments regarding the section about thermodynamical modelling - see specific comments.

Overall, it can be summarized as follows - scientific significance - excellent, scientific quality - excellent, presentation quality - good to excellent.

In conclusion, I recommend the manuscript to be accepted after rather minor revisions.

Specific Comments

Page 3 - lines 4 - 5: it is stated that "three lithotectonic nappe systems are generally dipping to the east" - however I have impression that the general structure of the eastern marging of the Moldanubian zone is gently west-dipping.

Page 6 - line 11 (and elsewhere) - here stated "as will be discussed later, its origin is secondary". In general, I would prefer that the description and interpretations of the features would be more separated - first the description, interpretation later. This is not the case of this manuscript and in some cases (as this), the interpretative statements are incorporated in the descriptive text without some supportive argument.

Page 7 - Figure 2: The Figure 2G seems not to be on appropriate place. It is not cited between Fig 2F and Fig 3. Since it is a figure showing already features of mineral chemistry, the reader does

not have information to understand all the indicated garnet types etc. that are shown in this figure. I think it should be somehow involved in Fig 5.

Page 11 - Figure 5C: The diffusion profile X-Y is asymmetrical. While the left (X) part has features described in the text (decrease of Ca etc.), the right side (Y) is missing them and in fact, the trends of the zoning resemble those observed by the profiles E-F, Q-S, and T-U (although the zoning is much less pronounced). Maybe this could be discussed in the text?

Page 12 - lines 6 - 7. You mention that the garnet C and Z1 have similar compositional characteristic, but you distinguish them based on the character of their occurrence. With respect to the Fig 2G - can you exclude that the C and Z1 garnets are really not the same type, taking into consideration possible effects of section of the garnet?

Page 13 - line 6 - 7. Sentence "GRT-type Z1 ... metasomatizing agents" is pure interpretation, however the reader does not yet have any background to understand it.

Page 14 - line 8: thin exsolution lamellae - of which phase?

Page 17 - line 9: statement "is isochemical to GRT-type C" should be rather "is almost isochemical". I think that this is not just a small detail but important point that although the local bulk rock chemistry did not deviate too much from the original garnet composition, the involvement of fluid (or melt) and the subsequent minor change of the bulk rock chemistry is crucial and the symplectites would probably not form without it.

Page 17 - line 17: It is worth to mention that the a-x model of cpx including the CaTs substitution was recently developed by Green et al. (2016 - Activity–-composition relations for the calculation of partial melting equilibria in metabasic rocks. Journal of Metamorphic Geology). I can only speculate, what would be the impact of using this model (together with the recent datset 6 by Holland and Powell 2011 and adequate a-x models of other solid solutions) on the calculated mineral chemistry. I know that this would need to be done by using either thermocalc or perple_x, but anyway, I think it is worth to test it.

Page 22 - Table 3: The table shows good agreement of the calculated and measured composition and modal proportion of phases. However I don't understand why the measured pyroxenes are not divided to CPX and OPX? (I would expect based on the presented images that the measured proportion of CPX would be considerably higher than the calculated one).

Page 22 - lines 5 - 8. See the comment Page 17 - line 17. I recommend to reformulate the sentence. The symplectites are not completely isochemical, as it is illustrated by the Fig 9.

Page 24 - lines 15 - 16. It is not clear if authors suppose that the garnet zoning was developed during the garnet growth or by modification of already existing garnet by diffusion during the metasomatism.

Technical Corrections

Page 2 - line 6 - Jedlička (diacritics)

- line 7 cf. Table 1 (missing space)

- from line 28 - list of abbreviations - missing abbreviations for muscovite and prehnite that are used later

Page 7 - Figure 2 - B - labels of minerals would be helpful. C - lines C-D and A-B are not explained in figure caption, as well as the elipse.

Pages 7, 9, and 10 - Figures 2, 3, and 4. The format if the figures is not unified. The scales and labels have often various fonts (see Fig 3C) and font size, sometimes are bold (see Fig 3B). The scales by BSE images sometimes involve information about voltage and current, sometimes not (see Figure 4). It would very good to unify the format of all the figures.

Page 9 - Figure 3: 3A - try to avoid intersection of line (arrow) wit text. Check formate of thearrow pointing from 3A to 3D. 3B - should be SPR and PL (instead of Spr and Pl). 3D - muscovite and prehnite are missing in the list of abbreviations. 3G - what is the strange bright rectangle in the centre of the image? Generally, there is not much visible in this figure.

Page 10 - Figure 4D + caption - profile T-Y is probably the profile T-U in the Fig 2G. Please check the Y/U throughout the text.

Page 11 - Figure 5: Maybe it would be helpful to mark the exact limits of described garnet types in the profiles by some vertical lines? 5D - I cannot find the E-F profile marked in any BSE of OM image.

Page 13 - line 11: Fig 5A - should be Fig 2G? I can see no dotted line in Fig 5A.

Page 19 - Figure 10B: Even after reading the figure caption, I am not sure what the yellow circle stands for. Should it just generally symbolize intersection of isopleths?

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