

Interactive comment on “Unravelling the origins and P-T-t evolution of the allochthonous Sobrado unit (Órdenes Complex, NW Iberia) using combined U-Pb titanite, monazite and zircon geochronology and REE geochemistry” by José Manuel Benítez-Pérez et al.

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Reply to the comments by M- Zucali, Referee #2 (13 May 2020):

The new data are of paramount importance in the understanding of this local tectonic setting as well in the general (global) framework of the Paleozoic geology. Since this paper addresses such a general question, it somehow needs to better introduce the general geology and associated data, as age and PT conditions. It is partly attempted

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in the background chapter but still needs a clearer (simpler?) presentation. As a non-expert in the regional geology, I've found myself lost through the text when trying to put the data at the right place in space (map), time (age), and former position (P-T conditions). Check out and simplify the use of different terms and subdivisions (e.g., units, horses, slices, etc...).

We kindly appreciate the work and constructive suggestions made by Prof. Zucali. Most of them will be incorporated in the corrected version of the manuscript. Here we will try to reply some general comments. We agree with the referee, geological background needs to be improved to reach a wider audience and a better understanding of the context. He wants it made more clear and shorter, but resuming a complex history is not easy and one has to choose between understanding and length. In our original manuscript, we made a rather simple text for the setting, but it was enough to arouse curiosity of Reviewer #1, who found things poorly explained. The new geological setting is now clearer and richer, including more age data and references, as Prof. Zucali too demands. But, sorry, it is somewhat longer. It seems that some readers will be interested in more regional information than others. A short Geological setting would not satisfy the first group, while a wider one can always be skipped by the latter.

Individual scientific questions/issues ("specific comments") 1) Age Interpretations chapter needs profound changes (see notes on the pdf file)

Some problems have been detected in some figures that will be corrected and explained in the corrected version.

2) Figures need some work; here a few details as well other on the pdf. Figures, in general, should be re-think and make them better fitting in the manuscript. Here some notes about the figures.

2.1) I really miss images of the rock, thin sections images where the mineral assemblage is shown, microstructural relations are discussed, and analyzed mineral are located in the microstructural frame. Forging the base of the interpretation of the ages.

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The minerals that we have used are not very informative in terms of textural relationships. The idea of REE-U-Pb combination is an attempt to solve this lack of information. Most of mineral assemblages have been previously described in previous references and the interested reader is referred to them.

2.2) I also think that the geological background data, in terms of P-T conditions and available ages, it may be conveniently shown in a synoptic diagram, which will turn useful for successive inclusion of your novel data and general discussion. A reference to Martínez Catalán et al. (2020) has been added in the Geological setting. There, a figure offers a synoptic resume of the NW Iberian Allochthon, Parautochthon and Autochthon. Furthermore, more ages, references and explanations have been included in the Geological setting after recommendations made by Reviewer #1 and Prof. Zucali on its annotated manuscript.

2.3) Figure1. I love the details on the map, BUT probably they are too much for this contribution. Don't you think? ==> within the three horses of the Sobrado, the map details different lithologic types (hard to distinguish on the map, by the way) and tectonic contacts with cinematic and so on. Those are not further used in the manuscript, either in the geological background or the discussion. It would probably be more useful and handy a simplified map. > check the consistency between FIGURE 1 and Geological background.

The geological background has been improved and enlarged in relation with comments and suggestions posed by Reviewer #1, which seemed interested in a better explanation of the whole history of the NW Iberian Allochthon and of Figure 1. One does not need to enter in the complexity of the figure if not feeling like, but may be others do.

2.4) FIGURE 2 It is used in two steps: first, at the mineral description paragraph, describing morphologies and zoning patterns; second, when discussing ages and their relations with the zircon patterns. The figure mirrors this double use (age groups and morphologies) but not the captions, too poor. Besides, depending on the size of the

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image in the final manuscript, several grains might result in small. So resize accordingly to your ideal print size.

Captions will be improved and figure resolution will be adapted for a better visualization in an on-line journal if needed.

3) some suggested references for general background and discussion: Manzotti et al. 2012 - Lithos 146–147 (2012) 276–292 Roda et al 2018 - Lithos 310-311 (2018) 31–49 Manzotti et al 2017 - Swiss J Geosci - DOI.10.1007/s00015-017-0284-1 Jouffray et al. 2020 -> International Journal of Earth Sciences - <https://doi.org/10.1007/s00531-020-01848-2>

Thanks for the suggestions. We will consider including some of the most relevant along the discussion.

Answers to comments made on the PDF: P1 L37: No, TuffZirc will be deleted P1 L42: Same as above P2 L24-25: references incorporated into the new version P5 L1-9: We will elaborate a new figure to clarify this point. P6 L10: We consider it's good practice explaining the process that we have followed in interpreting the analysis. Maybe we can specify that the analyses were considered no further for the calculation of the age. P7 L8: We thank prof. Zucali to point it out this problem. A complete table will be included in the corrected manuscript. P7 L12-13: Agree. An explanation will be included and that zircon removed. P7 L22: It will be changed by "This anomalous Ce content is related to the presence of water in the moment of zircon growth". P7 L25: No. P7 L34: We have substituted "magmatic signature" by "strongly fractionated pattern usually interpreted as magmatic". P7 L42: Yes, there is. Barth and Wooden (2010). We will change the reference. P7 L46: We will explain in a clearer way the evolution of the zircons. P8 L28: done P8 L30: Ok. P8 L38: 1. We will clarify this point. 2. You are right, TuffZirc is not a method. It's an algorithm. P9 L29: We will make a new figure to clarify the evolution and regional interpretation of ages.

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