

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.

Anonymous Referee #1

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Review of se-2020-38: “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 Benítez-Pérez et al.

General comments The ms provides with new geochronological data that contribute to the knowledge of the tectonometamorphic evolution of a very complex Paleozoic orogenic area. The combination with REE analyses of the dated minerals is relevant to

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constrain the interpretation of the obtained ages. This approach is particularly useful for the zircon ages, which show a great dispersal. The ms is concise and well written, and figures are appropriate (but some improvements can be made). I recommend publication after corrections, suggestions and clarifications are made. Section 2 (geological background) is too concise for a non local reader, it should be partially rewritten and extended (see specific comments below). A final discussion/conclusion might underline how the new data strengthen the understanding of the studied region. Large tables can be provided as supplement to the ms.

Specific comments P3 L3: Upper Allochthon detached from Gondwana during Cambro-Ordovician rifting; but both zircon aliquots (mean ages 490 and 530 Ma) are interpreted in a magmatic arc setting (see abstract, discussion and conclusions). L5: what does mean “oceanic supracrustal sequences”? something that overlies the oceanic crust? L24: these ophiolitic rocks belong to the Upper Allochthon? The referred ages are protolith or metamorphic? Give details. L25: these ages correspond to the Upper Allochthon? Are they prograde metamorphic ages? Give details. L26: thrust wedge collapse was coeval to continental subduction in the Upper Allochthon? Clarify. L27: which internal zones? L30: regional oroclinal bending in Iberia is under discussion (see also Pastor Galan...); leave it aside. L33: the study focuses on two units (Sobrado and?). L34: reference to this HP/HT event has been made in the previous paragraph. The older (Ordovician?) granulite facies event is not mentioned in this section, and it has relevance to the paper. Rewrite these paragraphs to be more comprehensive: give first a detailed description of previous geochronological data of the different units, then the preferred tectonometamorphic evolution. L37: lithological description of Sobrado horses is too succinct, more rocks appear in legend of Fig 1B. L38: lower slice: are these rocks ophiolitic? Could them belong to the underlying Middle Allochthon? P4 L11: Fornas in Fig 1? P4 L32-36: transfer to next section (mineral description) and rearrange. P6 L43: are there discordant analyses? (those with >10% have to be rejected, and display them with a different color in Fig 6), also in Fig 6 add an age histogram with probability density including all concordant ages. P6 L46: Fig 7A

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does not show the 380-500 Ma aliquot (why?), as Fig 7B do (see fig caption); use the same colors than in the following figures for the two aliquots, idem in Fig 11. P7 L1: you suggests "inheritance" (likely for <600 and possible for >600 Ma, why?). According to the interpretation, zircons older than 500 Ma (MDA) must be inherited. P7 L14: age results for the third aliquot (>600 Ma) have to be described here. P7 L17: REE patterns of zircons older than 600 Ma are not shown anywhere; for comparison, include them in Fig 9 (or at least make reference to a Table). P9 L16: slope from 486 to 380 Ma (Fig 11A). L16-19: you mean such a protracted evolution caused U/Pb to open in the zircons formed during the 490 Ma granulite event. But older zircons were not affected? if yes, the inherited ages (including the 530 Ma median age) are misleading. L21: 502 Ma? This age is used in Fig 11A (380-500 Ma aliquot) to obtain a metamorphic 490 Ma median age. Grain n° 61 belongs to the inherited igneous 500-600 Ma aliquot (Fig 2). Is it grain 61 the 510 Ma zircon in Fig 11B? If yes, MDA is 510 instead of 502 Ma. L39: inherited zircons older than 600 Ma. L40: I would not name "population" to a set of only 2-3 data. L46: WAC is an unlike source for Mesoproterozoic zircons. Gutierrez Alonso et al. (2003) sourced zircons of this period far from Amazonia, not from NE Africa cratons as in more recent interpretations (update reference). P10 L18: evolving to amphibolite-facies.

Technical corrections Do not use plural in the studied samples (a paragneiss, an amphibolite). P2 L16: facies. P2 L21, 32: luminescence P2 L22: petrogenetic P2 L47: . . P3 L8, 11: Autochthon P3 L14: associated P4 L11-12: detachment P4 L19: parts of P4 L16: xenocrystic P5 L32, 33: μm P5 L47: 2015b P8 L20: negative negative Arrow in Fig 1C: Corredoiras detachment? Fig 6: correct position of 1800 in the concordia line.

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