

Interactive comment on “Tectonothermal evolution in the core of an arcuate fold and thrust belt: the southeastern sector of the Cantabrian Zone (Variscan belt, NW Spain)” by M. L. Valín et al.

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RC2: The existence of two tectonothermal events is significant, but not well documented: there are simply two field photographs of the fabrics, from different outcrops, since they do not occur together. It is a pity that there is not a more detailed structural analysis to back this up, especially as the paper is titled “Tectonothermal evolution in the core of an arcuate fold and thrust belt: the southeastern sector of the Cantabrian Zone (Variscan belt, NW Spain)”. The thermal part is well covered, but not the

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tectonic part. AC: In order to reinforce the tectonic part of the manuscript, we have added a new figure with a cross section that illustrates the relationships between the S2 cleavage and the regional folds (Curavacas-Lechada syncline). RC2: The intrusions and related tectonothermal event are quite intriguing. Given the lack of syntectonic intrusions to the west of the study area in the Cantabrian zone, it is quite surprising to read about them here, and about an extensional event that is apparently not manifested to the west. It would make a really great addition to this paper if the geodynamics of this event could be explained in a broader context. AC: The intrusions of the study area are late-tectonic. Intrusions in other parts of the Cantabrian Zone are less common, but also occur in its western part and they are also late-tectonic. The existence of granitoid stocks in the study area is interpreted as a result of its location in the core of the Ibero-Armorican arc, as it is emphasized in the new text. An analysis of the tectonic evolution of the study zone in a broader context is beyond the scope of this paper, but we have given now some more details about the geodynamics of this event. RC2: The statement that metamorphic indices do not correlate with stratigraphy is made quite strongly. This is an important point, so a revision of this paper would preferably include a figure with averages and ranges for the major stratigraphic units. AC: As regard the KI, and considering that the values are independent of stratigraphy, averaging them by stratigraphic group would be misleading. Nevertheless Fig 7 gives the values of all of them by stratigraphic level in the different areas, and it is clear the lack of correlation of KI with stratigraphy. Just as an example of this, on that figure samples from the Viorna Group (E) have KI values from diagenetic to epizonal. As regard the CAI, a new figure has been introduced and the text has been modified in the manuscript according to this suggestion. The figure shows the independence between the CAI values and the stratigraphic location of the samples. RC2: Page 3, Line 97 ff. It would be good to state the age of these intrusions here. AC: This was already made attending a suggestion of the RC1. RC2: Page 4. Was conventional chlorite geothermometry considered as a method? The results in this paper are all based on XRD, so an alternative would be a useful check. AC: It was considered,

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but temperatures obtained were in general too high ($T > 450^{\circ}\text{C}$), due to the peculiar composition of the chlorites, and inconsistent with those obtained using chemical compositions of illites, the minerals present in the samples and the KI and AI values. RC2: Page 8, line 272. Replace “big size” by a dimension. AC: The text has been changed and a reference is now made to the intrusion involved in the text (Peña Prieta stock), whose size can be seen in the maps of the figures. RC2: Page 10, Line 365 ff. What does geophysics say about the likely sub-surface configuration of these intrusions? Could they have supplied the necessary heat? AC: There are not adequate geophysical data to know the sub-surface configuration of the igneous bodies. The corresponding text has been slightly modified to take into account this lack of data. RC2: Figures. The maps are very detailed and impressive, although it is difficult to see any broader patterns because of the detail, except for Fig. 8. One query is why the areas of igneous rocks on Fig. 6 are much larger than on the other figures. AC: The old Fig. 6 indicated with a single pattern the igneous stocks and the areas with small size igneous bodies not representable at map scale, whereas in the other maps there were only represented the igneous stocks. This was really confusing and we have now separated in all the maps with two different patterns the igneous stocks and the areas with small size igneous bodies not representable at map scale.

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/se-2016-53/se-2016-53-AC2-supplement.pdf>

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