We would like to thanks the anonymous review for the constructive comments on our manuscript. In the following, we will answer to the referee's comments and suggestions.

The authors distinguish three zones within the upper crust related to the volume of granites forming the crust. In my opinion there is not so significative difference to need a differentiation in three zones with distinct lithology except to the north where upper crust reflectivity changes.

We correlate the changes in the signature of the reflectivity within the upper crust with known geological features, such as the limit of the Duero Basin-Central System, as well as the Carboniferous-Permian magmatic zonation of the Iberian Massif (Simancas, et al., 2013). In Figure 4 differences in reflectivity can be observed from North to South, and they seem to correlate quite well with the above mentioned features. However, differences can be subtle as in the transition from Zone II to Zone III, and probably would not be so relevant if the magmatic zonation was not defined. Nevertheless, reflectivity can be affected by the quantity of granites as they have low impedance contrast, because of their massive nature.
Given all these premises, we correlate this geological features with observations in the reflectivity profile. What can be inferred from these observations is a qualitative assessment of the quantity of granites within the upper crust. Therefore, below the CS the quantity of granites should be higher than in its surrounding areas as there is a more homogeneous seismic signature.

Accordingly, we have modified the following sentences between lines 296-306:

Accordingly, we suggest that the extension of granites in zone II can be prolonged to the N of the Central System, even though they do not outcrop as they are covered by the Duero Basin sediments. In this context, it can be stated that below the Central System the upper crust is <u>mainly</u> formed by granites down to 5.5 s TWT, as they are massive lithologies that do not feature sharp impedance contrasts at the scale of the sampling waves. Zone III is imaged by the upper crustal reflectivity in the Tajo Basin and further S, which depicts the seismic response of metasediments featuring vertical folds accompanied by few granites, thus providing scarce impedance contrasts visible to high-frequency waves and giving a high-amplitude but relatively low-frequency response. As a summary, it can be inferred that the seismic signature of the upper crust sampled by the CIMDEF experiment is strongly influenced by the <u>amount of granites</u> and overall differences between its seismic response and that of (meta)sedimentary rocks, being the former the source of a low-frequency homogeneous seismic signature.

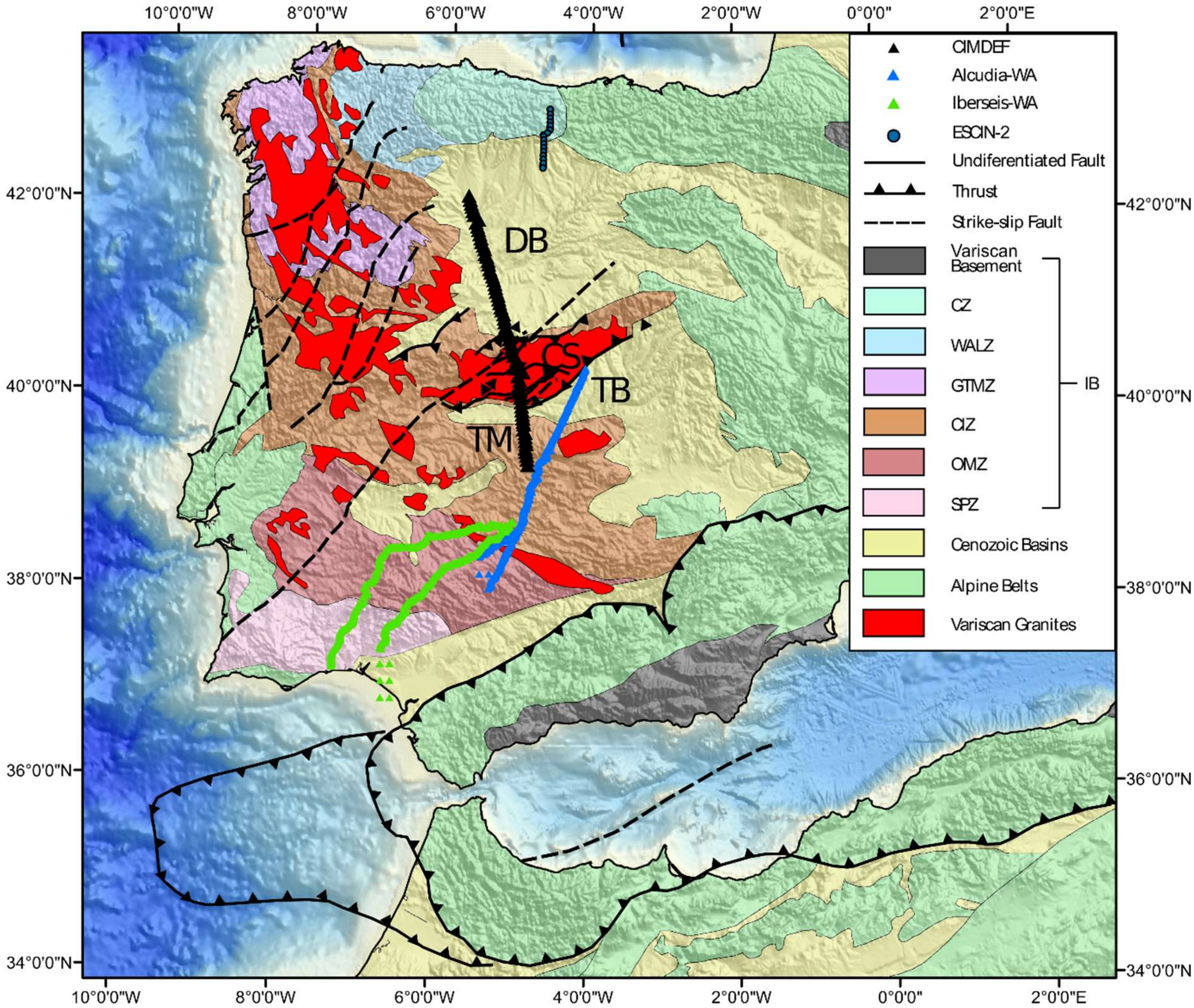
Furthermore, the authors discuss the upper-lower crust limit as a Variscan detachment level. It is almost impossible to regret the role of Variscan deformation on west Iberia lithosphere but it is also important taking in mind that the Central System could uplift up to 2.5km in the last 20My (De Vicente et al., 2007) and more than 4km of vertical displacement during Alpine tectonic events. Deformation accommodation in a pop-up model may need a detachment level or a reactivation of a former detachment. De Vicente et al., 2018 discuss this problem. These discussions do not increase the quality of the paper. In my opinion discussion must be shorter and differentiate clearly Variscan and Alpine proposals.

We agree in the important role played by the pop-up and pop-down model proposed by De Vincente et al., 2007, in accommodating the vertical displacement recorded during the last 20My. However, we discuss two features that can be or cannot be related, the upper-lower crust boundary and the crust-mantle discontinuity. Our interpretation for the upper-lower crust boundary takes advantage of the knowledge southward of our study area, where a Variscan detachment appears at the same travel time as in the Alcudia and Iberseis datasets. We propose that this feature is the northward continuation of that seen in the Alcudia and Iberseis datasets.

The crust-mantle boundary here looks significantly different than what has been proposed to date and therefore, a new interpretation of this structure should be provided. In this regard, we take up the discussion of de Vicente et al., 2018, between the existence of a detachment level or simply lithospheric folding, and we explain why our data does not support neither of these hypothesis. Therefore, we propose a scenario where the crust south of the CS under-thrusts that of the CS and appears as a deep, north-dipping feature. We suggest that this is the result of the Alpine Orogeny whether the detachment level, previously explained, played any role or not (allowing the development of crustal-scale thrusts or not). We believe this discussion and the structures proposed equally explain most of the uplift of the CS and could even be the key to understand the difference in altitude between the northern Duero Basin and the southern Tajo Basin.

The figures are appropriate and correctly drawn. I would appreciate some references in figure 1. In the legend, basement (grey colour) refers to Alpine chains Variscan basement outcrops. It would be worth so indicate.

References have been included. Legend relating the grey Variscan basement has been corrected as suggested.



New Reference: de Vicente, G., Cunha, P. P., Muñoz-Martín, A., Cloetingh, S. A. P. L., Olaiz, A., & Vegas, R. (2018). The Spanish-Portuguese Central System: An example of intense intraplate deformation and strain partitioning. Tectonics, 37, 4444–4469. https://doi. org/10.1029/2018TC005204

The reference is already cited in line 417, but it has also been cited in other parts of the manuscript as suggested by the reviewer.

Some comments are added to the manuscript pdf

The suggestions have been included in the manuscript.