

We thank Mr. Andersen and Mr. Vissers, for the attention they paid at reading our work. Their useful remarks surely help to improve the quality of the manuscript. Below are exposed the several point highlighted by the referees. We took the greatest care to satisfy those comments by changing, deleting and adding parts of the manuscript.

Color code:

Blue: referee's comment

Red: New portion of the manuscript in response of the referee's comments

Green: citation of the submitted manuscript

Black: Our Answers to the referees

Reply to the Interactive comment by Dr Andersen (Referee)

1- We agree with the referee and, in the introduction of the new version of the manuscript, we now mention and refer to the paleo-margins exposed in the Zagros and the Appalachian-Caledonian orogenic belts. However, in the Appalachian-Caledonian case, as for the Alps, the access to the syn-extensional metamorphic history of the margin is complicated by later metamorphisms. As stated in the introduction the reason why studying the pre-Pyrenean margins is extremely interesting is because, unlike the Alpine and Caledonian analog, this domain never underwent subduction.

2 - "Another topic that could be introduced and discussed is whether the NPZ is unique because of the early HT-LP metamorphism that can be attributed to the extension? Is this a feature we should expect universally in such tectonic setting and if so, why is this not commonly described from elsewhere? »

Yes, we added a new paragraph:

"7. Hot versus Cold margins?

Direct acces to the present day passive margin is limited by thick sedimetary deposits and information about the thermal history of the margin are hardly gathered. The use of fossil margins exposed in mounbtain belts offers a unique opportunity to study the metamorphic imprint of the extension. However, when not overprinted by the subduction metamorphism, the Alpine analog indicates only low grade metamorphism. At present, very few examples of hot passive margin presenting evidences of exhumed subcontinental mantle or deep crust have been reported. In the Zagros mountains, mapping reveals that pre-rift cover and mantle have been early superposed in the Kermanshah ophiolite (Wrobel-Daveau et al. 2010), where high temperature are recorded in the Mesozoic sediments along their contact with the peridotites (Hall 1980). In the Zagros of Iraq (Jassim et al. 1982) described a similar metamorphism affecting sediments close to exhumed ultramafic rocks with temperatures up to 750°C over 2,5 km thickness. In the light of our results, we propose a distinction between "cold" Iberian

or Alpine-type passive margins and “hot” Pyrenean –type margins. The cause of this thermal variability along passive margins could be explained by the kinematic context (transtension vs. extension) or in the mantle dynamics (hot versus cold mantle).”

3 – “Uplift” vs. “exhumation”. We agree with the referee and corrected our misuse of the word “uplift” throughout the whole manuscript.

4 – As suggested, we modified the legend of fig. 7. It is now in line with the international stratigraphic nomenclature

Details:

- “Alpine” with capital letter

- “boudin necks” instead of “pressure shadow”

- “widespread magmatism” replace by “moderate by well distributed magmatic activity” and “a wide variety of small intrusive and effusive Cretaceous alkaline magmatic rocks”

- “key-localities” instead of “kea-localities”

- “*quickly explain why you think thermal fluxes are more prominent in strike-slip (transcurrent) than other tectonic domain*”: We improved the sentence: « Since the deformation is prone to be more localized in a transform system, thermal fluxes are expected to increase with transcurrent motion (Golberg & Leyreloup 1990; Muffler & White 1969; McDowell & Elders 1980; McDowell & Elders 1983)” and added “Furthermore, because the deformation is more localized in the Eastern domain than in the western domain, isotherms may have been more spaced in the wider western NPZ than in the narrower eastern NPZ.”

- We added a reference to the example given by Souche et al, 2014

Figures :

- The inset frames numbers of fig. 2 have been corrected.

- A scale has been added to fig. 4

- The legends of fig. 2, 7 and 8 have been reorganized in stratigraphic order.

- In the caption of fig. 10, we replaced “Liassic” by “early Jurassic”

- Ar-Ar, Ar/Ar, $^{39}\text{Ar}/^{40}\text{Ar}$... have been homogenized and replaced by ^{40}Ar - ^{39}Ar throughout the manuscript