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Interactive comment on "Tectonic evolution and high-pressure rock exhumation in the Qiangtang Terrane, Central Tibet" *by* Z. Zhao et al.

Anonymous Referee #2

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This paper discussed the tectonic evolution of Qiangtang terrane in the central Tibet with detailed mapping and structural analysis. Based on the new and former data, the authors proposed a tectonic evolution model for the Qiangtang terrane, which emphasizes the existence of an ocean between North and South Qiangtang, which subducted mainly to the north from Permian to Jurassic. However as proposed, the oceanic subduction may also occur to the South in a certain, short period (around 240 Ma), which contribute to the exhumation of HP rocks. The paper discussed an important problem and well-written. However there are still some problems to solve before publish.

Main comments:

(1) The new idea of this paper is the southward oceanic subduction under the SQT terrane around 240 Ma, which stopped after a certain time, and then reverse the move-

ment. Based on most of the data, the evidence for this is not very convinced. The melt activity may be mainly related to the slab breakoff as many previous authors suggest. If the authors of this ms want to continue using this model, I suggest write an independent section/paragraph to summarize and highlight the evidences for this short southward subduction.

(2) Another main problem I am concerning is that the proposed model is kind of very artificial, especially for the transition from single to double subduction, and then changed back to single subduction again (Fig 6a-c). What are the conditions for the first transition, from single to double? I can imagine that the increase of plate push may contribute in a certain degree. Otherwise the slab pull driven subduction is almost impossible to evolve like those shown in Fig 6b. I am also quite curious about the conditions discussed in the manuscript for the second transition: the larger slab pull from longer slab that contribute to pull the shorter subducted slab returning back. Since the shorter southward subduction under the SQT terrane is a key character of the proposed model, used for the explanation of HP rocks formation and exhumation, thereby, could you try to discuss the conditions of this in more details, although I understand it may be difficult.

(3) As discussed in the manuscript, there are mainly two previous models for the HP rock in central Qiangtang terrane: southward underthrust model by subduction in the JSS suture, as well as northward subduction in the Shuanghu suture. For the second model, you show one problem (Line 515-518) which is from Kapp etal, who is the proposer of the first model. Are there any other problems for the second model? Or your model just solved the problem, proposed by Kapp etal for the second model, by adding a short southward subduction in a certain period of the main northward subduction? Could you compare your model and the previous two models.

(4) A key debate in this region is the existence, or not, of an ocean between north and south Qiangtang terrane. Are there any geological evidences for the subduction-related Arc and back-arc system around the Shuanghu suture? Could you give some discussion on this?

Other comments:

(5) Figure 1 included many data. They are from your own, or others. It is better to show clearly in the captions. Same for Figure 2.

(6) Section-3.2: After late Triassic, the NQT and SQT joined together. Therefore, the stratigraphic groups after that may not be needed to describe separately.

(7) The conclusion is very long, with many details already discussed in the main text. Could you shorten it and highlight the main ideas.

(8) Line 120-121: the age of suture zone closing AND exhumation of the high-pressure rocks; Do they have the same age? It seems not consistent with that discussed in the references.

(9) The ms should be polished more carefully in order to fix small errors (not only as I show):

Line 53-54, rephrase the sentence, e.g., delete the second ‘separated’;

Line 110: Zhai et al., 2012 -> 2013, and also in the reference;

Line 218: Jiaomuchaca group belongs to NQT? Are you sure?

Line 359: Zhai et al., 2012 -> 2013;

Line 598, delete one ’sediments’;

Line 698, paced -> placed;

Line 869, wrong author name;

Interactive comment on Solid Earth Discuss., 7, 329, 2015.