

Interactive comment on “Contrasting exhumation histories and relief development within the Three Rivers Region (Southeast Tibet)” by Xiong Ou et al.

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The manuscript “Contrasting exhumation histories and relief development within the Three Rivers Region (SE Tibet)” by Xiong OU et al. provides an interesting contribute to the debate about the role of tectonics on the exhumation of Tibet. The work is based on an already existing dataset of thermochronological data that has been processed through 3D thermo-kinematic modelling. Different scenarios have been investigated, testing the relative roles of tectonics, regional uplift and localized erosion. The manuscript is well written, with a proper description of the procedures and the results and an exhaustive discussion. I have some minor issues that are detailed here below.

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Lines 52-54. The age range for this rapid exhumation event is very large (from 20 and 60 Ma). I do not think that it is possible to talk about a single "phase" as more there one could have been taken place in a single region.

Lines 75-78. As it is written here, it is not clear if the role of tectonics in the exhumation of Kawagebo is derived from literature or is one of the output of this work. I would better specify which are the goals of the paper.

Figure 1. Separation of AFT and AHe ages in two separate maps is good in terms of readability but it forces to move from one figure to the other to have a complete picture of exhumation ages. Is it not possible to merge all the ages in a single map?

Line 85 (caption of figure 1). Why grey outlines? I see only black lines around these surfaces.

Line 103. The name "AilaoShan fault" is not in the map. Moreover, the "Red River" marks a fault and not a river.

Line 107. This sentence is not related to the previous one as they deal with very different topics. So, why "in contrast"?

Lines 108-111. This sentence is not well connected to the previous ones. In general, this paragraph appears as a collage of sentences with no clear relationships between them.

Line 112. How can a shear zone join a river? Furthermore, the AilaoShan-Red River shear zone is not marked in the map of figure 2a.

Lines 116-118. The only Eocene deposits visible in map of fig. 2A are located east of the city of Deqing. Is it just a matter of scale? In the text you describe "several thrusts affecting Eocene basins".

Figure 2A. There is a thin red line in the top of the map, nearly parallel to the Yangtze river, that is probably not correctly drawn. In the legend, check the word "Eocene". The

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colors of Triassic Yidun and Qiangtang formations are very similar

Line 153. "...of the onset of this rapid exhumation phase". Are you referring to the 8 Ma or 1.5 Ma step?

Lines 155-156. Which structure? The stepover? Actually it is defined by faults and I see that these faults have been mapped and here described.

Line 158. What do you mean with "collision period"? Tectonics here was changing through time so, for example, the Eocene is marked by extensional basins.

Lines 186-187. The second part of the sentence is not very clear. Can you better explain the meaning of "transition times"?

Table 1. It is not clear if the references are related to the left or the right parameters. Or both?

Lines 222-223. This conclusion is referred to the steady-state scenarios only? Or is it more general?

Lines 230-232. I agree on the focus on AHe and AFT but... what happens if you exclude the ZHe data also in the previous scenarios? Such a change in the input data could have relevant effects on the outputs?

Lines 289-290. Why since 10 Ma?

Line 299. Given the dipping angle, I would not use the term "thrust" for this fault.

Figure 5. I am a bit confused... Each arrow yields a color which should be related to an exhumation rate... but is this figure associated to a specific time? In fact, here you write about the presence of different exhumation phases.

Lines 345-350. I am not sure that this sentence is correct as your model is starting at 22 Ma. All the events cited here are occurring mostly before 22 Ma.

Line 352. So the paragraph above is related to the models starting before 22 Ma? This

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is not very clear. But, if this is true, why are you discussing the models starting before 22 Ma if you write that these are not resolving well the dataset?

Line 368. This is not the definition of "relict surface" or, better, its definition should not be related to time of collision (Clark et al. do not give any definition like that).

Lines 385-386. Actually there are not so many data between the Parlung fault and the Longmucuo-Shuanghu suture and young ages are widespread also more to the south and to the north.

Line 388. Define the acronym EHS.

Lines 390-391. An extrapolation of the present-day velocity field to 10 Ma ago can be chancy. On the other hand, if your results are coherent with the present-day velocity field, you can infer that plate kinematics has not changed since then.

Line 395. Not sure about the use of "far-field" as this area is along the border of EHS.

Line 413. What do you mean with "since 10 Ma at river level"?

Lines 424-426. Your model is clearly designed to verify the amount of tectonic exhumation along a thrust and the results to confirm that this model is working well. Furthermore, no acceleration of exhumation since 1.6 Ma is occurring in the BaimaXueshan massif. As a whole, these data seem to indicate that glacial erosion, if present, was of minor importance. This is an interesting outcome that could be emphasized.

Line 442. What do you mean with "postulated crustal geometries of fault"? Are you referring to the "black" faults or the active ones?

Lines 454-456. Once again I would stress the fact that data and your modelling focus on the "young" (i.e. Neogene) part of the history. So I am not very sure that you can affirm that tectonic events were negligible before 10 Ma

Line 456. Can you put a number? Otherwise the meaning of "moderate" is ambiguous.

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Line 460. I would emphasize also the inferred acceleration at 1.5 Ma and the exhumation rates that jump to values higher than 1 km/Ma (one order of magnitude).

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