

Reply to Dr. Richard Ott:

5 *"The authors did a good job at addressing most of my initial comments. The discussion on tectonic and lithologic effects for knickpoint formation have been improved and easier to follow. I really appreciate the new figure S6, highlighting that the reverse fault at the Beida knickzone has been inactive since T2 formation. The figure quality in general has improved. I feel like this manuscript can be published after addressing some minor comments.*

10 *I understand the reservations towards calculating chi with a constant drainage area-discharge relationship. However, the observation of different knickpoint locations along the major rivers is still very interesting, and deserves a more quantitative analysis. The authors point out regional precipitation gradients that have been constrained in other studies. I suggest to use these data to calculate precipitation corrected chi-values and see if this correction makes the knickpoints line up in chi-space. If there are not enough data to calculate precipitation corrected chi for all the drainage basins, the authors should at least qualitatively discuss if the known precipitation gradients would bias the knickpoints along the main stems into the right direction (e.g. less knickpoint migration in streams with lower precipitation)."*

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25 Thank you for the suggestion. We have included a supplement figure (figure S7), which shows the chi values and adjusted chi values of the three rivers. The chi plot normalizing with upstream drainage area, shows that rivers in the east retreat more than rivers in the west. We suggest this east-west difference is partially caused by the east-west precipitation gradient. We therefore adjusted the chi plot by normalizing based on the present discharge at the mountain front of the three rivers. This adjusted chi plot brings the normalized knickzone locations of Maying and Hongshuiba River closer to the Beida River knickzone location, while the eastward trend of increasing normalized retreating distance still exist. We suggest both the timing and amount of precipitation during the mid-Holocene pluvial period could account for the remaining difference. We suggest these evidences enhanced our argument of monsoon and orographic effects strongly impacts the incisional behavior of the rivers. We have incorporated this interpretation into the Discussion section, in lines 459-484.

L57: typo. Northeastern.

L59: There is a typo in the exhumation rate. I assume the unit is meant to be 1m/kyr.

30 *L465: Typo.*

We apologize for these mistakes. We have corrected the typos.

L89-91: The authors use the word "canyons", but mean the incision into the Pleistocene alluvial fans. The word canyon could also apply to the river valleys in the mountain range. Please rephrase.

35 We rephrased the sentence as: "The canyons of the three rivers are deepest at the mountain front where the North Qilian fault juxtaposes bedrock against Quaternary sediments, ~130 m, ~190 m, and ~240 m for Beida, Hongshuiba, and Maying River, respectively"

40 *L126: Typo. I think the authors meant IntCal13. (by the way, an updated calibration curve has been published, IntCal 20).*

45 We corrected it to "IntCal13". Thank you for bring our attention to the newest calibration curve updates. We have checked the calibration results of IntCal20 and compared with the old ages. For all the samples, the differences between the two calibration approaches are generally less than 10 yr, and won't affect our interpretation and modelling of the incision history. For this reason, and also as an attempt to keep our age data internally consistent, we decided to keep the IntCal13 results as it is.

Reply to Dr. Chris Sheehan:

50 *It was a pleasure reading the revised manuscript from Wang et al. The manuscript has been greatly improved from its previous version, and all my comments have been adequately addressed. I believe that the current version of the manuscript is nearly ready for publication. I have only three very minor formatting comments, none of which I believe warrant a new draft to be circulated before final acceptance. In my previous letter, I echoed the suggestion to include chi plots of the three major*
55 *rivers. In their response to Dr. Schwanghart's first comment, the authors explain that drainage area is not an effective proxy for discharge in this field area due to strong vertical and longitudinal precipitation gradients (I agree with this point). While they don't explicitly say so, the authors seem to imply that when they performed a chi analysis, the knickzones did not have similar chi values, and they attribute this to the poor correlation between drainage area and discharge (this would make sense to me). If this is indeed the case, I think it might still be useful to include the chi plots and discuss them in Lines 443-471 (dissimilar chi values due to a poor drainage area / discharge*
60 *correlation is itself an interesting result potentially worthy of discussion). That being said, I think the manuscript is still suitable for publication without them, and so I will defer to the authors and the other referees on the matter.*

Thank you for your positive feedbacks on our revised manuscript. We agree that including the chi
65 analysis can be an enhancement of the argument that we put in the last part of the discussion. We therefore include chi plots based on drainage area and chi plots adjusted using discharge to the supplement, and rewrote lines 458-471. Details are in our reply to Dr. Richard Ott (lines 17-27).

Line 177: "(Figure 3c." should be "(Figure 3c)". There is a missing closed-parenthesis.

70 *Line 465: "fast" should be "faster".*

We apologize for these mistakes. We have corrected the typos.

Figure 4a: Please add an elevation scale / color bar

We have updated the figure and added the elevation scale.

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85 Other minor revisions:

Line 5 (marked document): add affiliation.

Line 11, 92, 111, 410, 467: minor changes in elevation and distance values to keep these values consistent throughout the manuscript.

Line 46, 198, 389: add supplementing information.

90 Line 105: round decimals.

Typos and grammar corrections.