

Interactive comment on “Reviews and syntheses: Anthropogenically breaking macro-ecospacial “chains”? – case review of HU Line” by Yi Lin and Martin Herold

Anonymous Referee #3

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General Comments: In the contributed manuscript, the authors reviewed literature for the question of whether anthropogenic activities can break the major macro-ecospacial transition zone in China, i.e., the Hu Huan-Yong Line. The authors discussed the natural formation and spatiotemporal stability of the line, suggesting small-scale modifiability of the line. Integrative approaches have been proposed to account for external, internal, and integral processes of future evolution of the line. In general, I find the manuscript not crystal clear and have a few major concerns. First, I missed the justification of the scientific question to be addressed here. Why were the authors motivated to explore whether the Hu Huan-Yong Line can be anthropogenically reshaped? The authors claimed that the intentionally-positive anthropogenic feedback to environment

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at the microecosystem scale and how such ecological effects work have been less studied, and that China's conspicuous macro-ecospacial changes and massive environmental restorations make the line as the optimal case for filling the gap mentioned. However, around the world there are many ecological restoration projects covering broad geographical extents with clear biogeographical zoning. For example, rewilding projects across Europe promoting the return of large-bodied mammals have modified the previous boundary between humans and wilderness (Chapron et al. 2014 Recovery of large carnivores in Europe's modern human-dominated landscapes). In other words, the Introduction has not been successful in reviewing recent scientific progress on the topic, unable to identify current knowledge gap. Importantly, proposals by the authors have not been sufficiently justified. In each section of "Comprehensive exploration of HU Line evolution", the authors repeatedly argued that incorporating biogeographical, bioclimatic, and Earth system models will help predict the evolution of HU Line. However, the authors simply reviewed some cases of existing models, without elaborating on their links to HU Line and how they can be used as examples to forecast future changes in HU Line. I was expecting more discussion in depth on these key questions. Otherwise, the current status of review seems a simplistic compilation of models published, with general, unconvincing proposals. Figure 5 is not self-evident enough, as I was not informed about how these models are related to Hu Line so as to improve our ability of understanding the dynamics of HU Line. Besides, there are incorrect wording and references in the manuscript that have compromised the readability of the manuscript. For example, "undermining" (line 39) and "exploitation" (line 42) should not be the correct words. The reference in line 54 and line 204 seems irrelevant, as I didn't see that the points made by the authors have been articulated in the cited article, which emphasizes the hierarchical links among local, landscape, and macroecological processes in ecosystems at large scales. Personally, I find the writing difficult to follow. Please check the language and citations throughout the manuscript.

Specific Comments Lines 10-13. The terms "feedback" and "chain" at the beginning of the Abstract would be difficult for readers to get their exact meanings without clear

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definition on the first use. Please clarify. Lines 24-26. This statement is too general. The readers would be likely wondering about more details. Please be more specific about the “fundamental implications”. Lines 30-38. As mentioned earlier, please re-identify on the knowledge gap. Meanwhile, I was not convinced by the logic of linking the gap to the topic of “microecosystem-related ecological spatial (macro-ecospacial) layouts. With so many terms lumping together, please provide more clear information on each term. Also, please clarify how this topic is related to the concept of “transition” below. Lines 43-47. Why do regional- to continental-scale terrestrial transition zones resemble chains? This analogy is still unclear to me. Line 54-56. Would these two statements be too strong? It would be hard to imagine that there are few massive conservation and restoration projects in the regions mentioned. Or, please clarify the definition of “massive human improvement measures”. Line 70. Has China completed its industrialization? If so, when? Lines 77-79. There are other large-scale ecological restoration projects around the world. The word “optimal” would be too strong. Lines 82-83. How this question is related to the previous texts? Line 238. Please replace “by” with “of”. Lines 238-239. How general is the conclusion that HU Line would be stable at the decadal scale? Historically, the boundary between farmers and nomads, which is closely related to HU Line, can be strongly affected by precipitation over decades (Bai & Kung 2011 Climate shocks and Sino-nomadic conflict). Lines 286-288. Why are local changes justified as evidence of breaking HU Line? Would the broad-scale pattern still persist even with local-scale noises? Lines 288-303. As far as I know, the statements here on human population dynamics and climate change in China are not consistent with historical evidence. Please review the most recent advances (e.g., Wilkinson 2018 Chinese History: A New Manual; Li et al. 2018 Reconstruction of the cropland cover changes in eastern China between the 10th century and 13th century using historical documents; Ge et al. 2016 Recent advances on reconstruction of climate and extreme events in China for the past 2000 years; Chen & Kung 2016 Of maize and men: the effect of a New World crop on population and economic growth in China) and rephrase this section. Lines 312-313. Please elaborate on this point, i.e., uncertainties of the

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final effects. Line 331-332. Too general. There are always uncertainties in future ecological outcomes. Please specify in details. Line 364. Throughout this section, I didn't see texts on the future evolution of HU Line. Please see the general comments above. Line 366. The word "handle" would be a little too strong. Maybe "account for"? Line 504. I didn't get the meaning of the word "integrally". Please clarify. Line 528-529. This statement is too general. Please be more specific and relevant. Line 534. What was "even though" meant here? Lines 536-537. Research on anthropogenic eco-effect on nature and its macro-ecospatial pattern is neither novel nor trivial. Please reconsider the implication of the review.

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