

***Interactive comment on* “Formation and dynamics of sandy dunes in the inland areas of the Hexi Corridor” by Bing-Qi Zhu**

Anonymous Referee #2

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I have enjoyed reading the manuscript, but, in its current form, the study is not fit for publication. This is mostly due to the uncertain intellectual contribution of the author. The manuscript does not represent a substantial contribution to scientific progress (substantial new concepts, ideas, methods, or data). It appears to be entirely based on previously published data sources. While the author gives due credit to these sources, it remains unclear where and to what extent findings in this manuscript transcend those from publications in which the data was originally conceived. The author does not give due credit to all literature, particularly western literature on the subject/from the region.

The manuscript is lengthy, and not succinctly written. The text would benefit from a rewrite including clarifications, and shortening. I will offer some comments (requests for clarification, see detailed comments) for the first paragraphs: the author should not

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perceive these as a complete list, but an indication of how to also improve subsequent sections of the manuscript.

Coupling between text and figures is incomplete. Topographic terms mentioned (and referenced to particular figures even) are missing on maps, which hampers scrutiny of the research. Figures need improvements (see detailed comments).

Detailed comments (examples): L56: why should eolian sediments respond to global climate change rather than regional or local climate changes??

L58: use units in conjunction with figures/numbers: 556,000 km²

L60: I'm not sure anything can cover a background.

L79-81: "...a dispute in people's understanding, such as "the theory of climate control", "the theory of tectonical/geomorphological control" and "the theory of groundwater control", geomorphological survey is essential to resolve this dispute.". Such mention requires referencing.

L82-84: "...where the dune landforms and desertification processes cover almost all the important information archives that understanding the earth system." Awkward phrasing: rewrite.

L87: The use of "especially wind and atmospheric circulation" appears highly redundant.

L89-90: "...China and some famous 90 steppes in history but are..." This is a highly unclear expression, and the use of "but" is questionable.

L91: you use both "Ka" and "myr" which is inconsistent. Moreover, kilo should be stated as "k".

L94: what global changes are referred to here?

L94: "...response to global changes. Therefore, it is of great significance..." there is

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a logical gap between how dune morphology would reflect global climate change, and would merit the start of this sentence with "Therefore, it is of great significance...".

L97-98: "The formation and dynamics of sandy dunes in the world were observed and studied for the first time in the United States (Finkel, 1959) and the former Soviet Union (Znamenski, 1962) in the 1950s." These assertions make little sense, already in 1941 Bagnold published his landmark book, a Chinese(?) version of which you refer to as 1959: The Physics of Blown Sand and Desert Dunes. Weren't his observations from Libya?

L98-99: You then write "During this period, the famous desert physicist Bagnold..." except that his work originated from the 30's?

L104: Why the use of "However"? what's the contradiction?

L105: "...later development of refined and quantitative researches...". They already were quantitative.

L112: "... is considered to be the main source area and the engine area of...". Explain what the engine area means, and how it differs from being the source area?

L116-121: "It is unclear why this paper would go beyond the studies that have first reported the results on which this study leans."

L129: use unit.

L130: Alashan Plateau can't be found on a map.

L131: I wonder if "in" should be "to" and I believe you mean "separates" rather than "distributes"?

L132: Ulanbuhe Desert can't be found on a map.

L133: redundancy regarding location of Qilian.

L134-135: redundancy in the use of "such as" and etc.

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L143: Add reference to substantiate the highly precise number.

L145: Add reference to substantiate reference to “a necessary place for the famous ancient Silk Road in China”

L147-148: you seem to imply that the onset of desertification is all anthropogenic: are there no climate drivers at all?

L149: “the combination”? unclear what is implied here

L152, 160: “west of Wushaoling and the east of Palaeo-Yumenguan (Fig. 2)” none of the place names occur on Figure 2. Make sure not just a few but all the placenames occur in Figure 2.

L161-167: Unclear (final) paragraph: why is the Minqin Basin described in some detail, yet there is no illustration to help make a valid point and no references to back-up precise numbers?

L166-167: “...dunes are distributed on the northwestern edge of the oasis, i.e., the windward of sand transport winds in the oasis.” Unclear description.

Figures: Apart from Fig. 1, there are no original figures in this manuscript, all are modified from previous sources.

Figure 1: Three rivers are mentioned in the text, only one of them is on the map. Please insert the others as well. It is unclear what relation the "Gansu" in the insert has to "Gansu Province" in the main map. Is the Hexi Corridor (different shade of grey) a part of the Gansu Province, or are both of them part of "Gansu" as per the inset map? The 40 N dashed line is wobbly rather than smooth.

Figure 2: This map cannot be appreciated sufficiently. Perhaps its readability can be improved if the three classes of dunes (mobile, semi-fixed, fixed) can be separated from each other with colors and moderate opacity. Is Gobi desert a fixed dune type? Certainly Oasis is not a fixed dune type? What does (a)-(c) stand for? Please make

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sure the rivers continue unbroken behind place names. Rivers are not part of the legend, neither are settlements. I can't see a good reason why all the coordinates have to be in half degrees: simplify by making it 39-51 N and 95-103 E. Qilian Mountains is repeated, although in one instance it is underlined, in the other it is not. In one instance it is Mountain and in the other Mountains. 100km should be 100 km.

Figure 3: Five mentions of "see Table 1 for geographical locations of the corresponding dune IDs" should be reduced to one. Also, dune numbering in Table 1 continues such that in panel b they should be numbered 12-17. Dune numbers on the x-axis in panels (d)-(e) need to be adjusted. Presumably, the values plotted in panels (c)-(e) are averages for 2006-2015; if so, this should be mentioned in the caption. Standardize the use of "pyramid" and "pyramidal" dunes. Why is panel (e) labelled "swing speed" and is it different from the others? If correct, change the caption phrasing.

Figure 4: Does the dune numbering follow Table 1? If so, make reference to Table 1. If not, explain in the caption what the numbering refers to. Also, this is indeed the same as Zhang and Dong safe for the colouring. I would additionally try to separate dunes 16 and 18 using filled symbols in one of them (use the same style as in Zhang and Dong).

Figure 5: spell out "UCC". To me, this looks like an exact copy of Ren et al. 2014; I'm really not sure what the modification is? This should be mentioned in the Figure caption. Make sure B, BM, TNE, etc... are defined in the figure caption.

Figure 6: This is exactly the same information as in referenced Zhang et al. (2020) but the panels have been rearranged. There is an omission from the original data that Co sample in panel (d) has an upper boundary of 8.5 according to the original figure. Explain UCC and 1950 (is this valid for all panels or merely panel (c))?

Figure 7: The panels have been rearranged relative to the figure caption. Is this the caption of the original publication? Panel (f) information (variation in average annual wind speed) does not exist?

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Figure 8: is this "Depth to groundwater surface"?

Table 1: I'm not sure what "length of beaches" have to do with anything? There is no mention of beaches anywhere in the paper proper? It would be good to have a figure similar to Ren et al. 2014, Figure 1, with the locations of the dunes within the study area. This should be accomplished in a new Figure 1.

Table 2: why do the heights of Barchan dunes 7-11 not match those of Table 1 (but barchans 1-6 do!). Please explain "camponotus". Should "forward direction" be the same as "movement direction" in Table 1? They are again for dunes 1-6, but not 7-11? Again the term "beaches" is used. Why do these numbers not match those in Table 1. make sure to explain better in the table headers what differentiates the different tables (unless they are the same).

Table 4: change Weahter to Weather.

I am sorry I couldn't be more positive in my review of this submission, but I wish the author all the best in pursuing publication of this body of work from the Hexi Corridor, and I hope that my comments may help in that pursuit.

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