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Interactive comment on “Neogene tectonics and climate forcing of carnivora dispersals between Asia and North America” by H. Jiang et al.

H. Jiang et al.

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1. I read through the paper, but the paper seems to lack data sets to connect tectonic changes and environmental changes and to correlate environmental changes and carnivoran dispersals. The paper shows that sedimentological and floral changes at the Tibetan Plateau, global geochemical changes, and faunal changes between Asia and North America occurred coincidentally, but fails to provide and prove a specific causal hypothesis for each time interval. Yes, you are right. We have added detailed discussion for each event in our revised manuscript.

2. It is not clear why carnivorans were chosen, and their data of carnivorans are only from Qiu (2003), or more specifically Fig. 2.1 of Qiu (2003). I suggest that the authors

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to reconsider aim of the paper and to prepare data set that can prove correlation of environmental change and faunal change in specific chronological intervals and geographical areas. I must admit that I am a palaeoenvironmental researcher. This manuscript contains such logic process of thinking. First, we found four faunal dispersals between Asia and North America during the Neogene published by Qiu et al. (2003). Second, we found these four mammal events are consistent in timing with four major environmental events published in succession recently. This excited us at once. Then, like many others, we want to know what is responsible for occurrence of these events during the Neogene period? Third, tectonic movement and climate change are commonly the controlling factors and we want to know which one or both acted for each of these events. So we collected, compared and analyzed a large number of published records with an aim to explore the major factor for each event. Accordingly, thank you very much for your good suggestion. But I am not a mammal researcher and your suggestion is regrettfully beyond my research scope.

3. There are plenty of references, but there are not many literatures on carnivoran data. All except one (Tseng et al. 2013) were cited by Qiu (2003). Although the running title of this review paper is “Carnivora dispersals between Asia and North America”, the carnivoran data part of this paper was done by Qiu (2003). Yes, as addressed above, we want to know what factors are responsible for each event in this paper. Qiu (2003) provides a good chance for us to correlate carnivoran dispersal and environmental changes during the Neogene period. I am not a mammal researcher and can't collect many or even most literatures on carnivoran data.

4. Figure 1 of this paper was adapted from Fig. 2.1 of Qiu (2003). It is inaccurately modified: (1) the first migration reached after the beginning of Hemingfordian; (2) Qiu (2003) considered that the bi-directional dispersal occurred during the Blancan, but a westward dispersal occurred before the eastward dispersal in Figure 1 of this paper. Apparently, you didn't understand the purpose of this paper as described above. Four time intervals, ~20 Ma, ~11 Ma, 8-7 Ma and ~4 Ma, have been clearly proposed by

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Qiu (2003). Since he provided definite age control for each carnivoran dispersal event, I have no reason to make them fuzzy again. In our Figure 1, we did not mean to modify Qiu's results and just emphasize occurring time of these four events.

5. The Neogene carnivoran (and mammalian) fossil records in Asia are less complete than those of Europe and North America. Timing of an immigration event from Asia to North America may be identified based on the first appearance of the taxon of interest in the faunal succession. In contrast, estimating timing of immigration to Asia is less reliable, because the Asian (East Asian) faunal succession is not as complete as that of North America. Referring recent literature (e.g., "Fossil mammals of Asia: Neogene biostratigraphy and chronology", edited by Wang Xiaoming et al., 2013, Columbia University Press) may improve such disadvantage in East Asian fossil records to some extent. Thank you very much for your kind suggestion of new and more mammalian records in Asia. But I am not familiar with these carnivoran types and maybe a new research like Qiu (2003) should be conducted in the future.

6. Although systematic revision of taxa is beyond the scope of the paper, data of some taxa may be used with caution. For example, *Amphicyon* is a waste bascket taxon, and it is not clear whether Asian *Amphicyon* species are true *Amphicyon*; thus, the migration of this genus across Asia is supported by its presences in Europe and North America but it may not be supported by fossil records in Asia. Thank you very much for detailed and concrete information on particular taxon. Since *Amphicyon* is present in Europe and North America, we can't rule out its presence in Asia in the future even though it hasn't been discovered in China up to now. So we want to remain it in the present paper this time.

7. The authors provide maps of localities where the tectonic and/or environmental data were collected; however, they did not show the distribution of the fossil localities. Thus, no data is indicated for environment of the place where the fossil carnivorans actually were present. Also, I wonder how widely these carnivorans distributed. Some genera may be found many places in the Old World, indicating high dispersal ability. The others

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may be found a limited area or environment (e.g., present Palearctic part of Eurasia; forest-dwellers versus open land). How did these differences affect formation/reduction of biogeographical barriers by tectonic and climatic changes? Also I am not a mammal researcher and can't provide the related information you proposed here.

8. The carnivorans in this paper are terrestrial mammals. They have to cross the Beringia. This paper provides tectonical and environmental data around the Tibetan Plateau. Tectonical changes that allow the connection of the Bering land bridge should also be discussed. Climate condition is probably different among the Tibetan Plateau, the Beringia, and the area between the Tibetan Plateau and the Beringia, and the data from different area is required to evaluate climate effects on animals. The tectonical and/or climate changes may decrease the environmental differences among the geographical regions so that the animals could migrate. Otherwise, the animals may be forced to migrate due to competition, niche opening, and other causes. In our introduction, we have provided related information about the Bering land-bridge and reference (lines 80-84, p.4), we have no further concrete information or evidence about its exposure or submerge in the sea at different time interval. Everything we can do is to give some speculation. So we feel it is unnecessary here.

9. Figures 2 and 6: maps should be labeled in a constant manner; I do not understand what the color of the maps are supposed to indicate (e.g., blue looks like sea) - if there is no information a simple black and white line drawing map is better. Yes, you are right. Please see our new Fig. 2.

10. Figures 1, 3, 4 and 5: Make graphs in a similar style. In Figure 3, the chronological axis is horizontal, while in Figures 4 and 5, the axis is vertical. Migration intervals are indicated as dotted lines in one graph, while they are indicated as grey zones in the others. Sorry, your suggestion seems irrational because 13-11 Ma and 8-7 Ma are time intervals while 4 Ma is time point. It is really unnecessary to show them in a similar style.

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11. title: carnivorans Figure 1: *Phoebrocyon*, *Potamotherium* References - Eronen & Rook 2004: primate References -Tseng et al. 2013: *Chasmaporthetes* (in Italic) Done.
Please see the text. Thank you very much!

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Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/7/C1465/2015/sed-7-C1465-2015-supplement.pdf>

Interactive comment on Solid Earth Discuss., 7, 2445, 2015.

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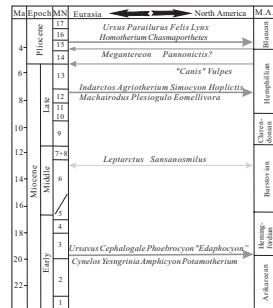
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Fig. 1

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Fig. 1.

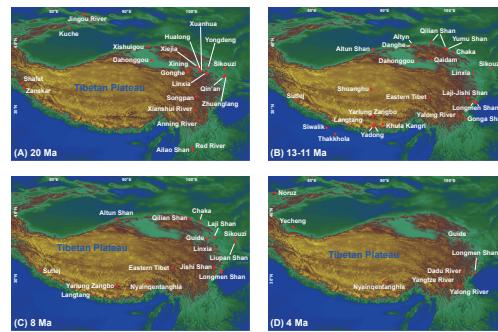
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Fig. 2.

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