

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

**Anonymous Referee #2**

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<General comment>

(Firstly, I would like to state that I am a mammalian vertebrate paleontologist; geophysicists and sedimentologists should evaluate the authors inferences on tectonical and paleoenvironmental data of the Tibetan Plateau. )

I read through the paper, but the paper seems to lack data sets to connect tectonical 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. 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 C1416

(2003). I suggest that the authors 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.

<Specific comments>

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).

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.

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.

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 basket 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.

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 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?

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.

<Technical comments>

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.

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.

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title: carnivorans

Figure 1: Phoebrocyon, Potamotherium

References - Eronen & Rook 2004: primate

References - Tseng et al. 2013: Chasmaporthetes (in Italic)

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

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