

## ***Interactive comment on “Regional Pliocene Exhumation of the Lesser Himalaya in the Indus Drainage” by Peter D. Clift et al.***

### **Anonymous Referee #2**

Received and published: 19 March 2019

General Notes: The authors present new bulk sediment Sr and Nd isotope data, coupled with U-Pb dating of detrital zircon grains from sediment cored by IODP 355 in the Arabian Sea, which are used to reconstruct of erosion in the Indus catchment since 17 Ma. They find a balance of sediments sources between Himalayan and karakoram since 17 Ma, which is largely related to tectonic controlling. This is an interesting paper which is also well written and easy reading. However, I propose several suggestions here which might be useful for the authors to consideration. I think this is a nice manuscript which should be published with moderate revision. 1. The role of Indian monsoon evolution on the sediments sources need to be better integrated. The authors argue that the summer monsoon does not reach the Karakoram (Karim and Veizer, 2002), therefore, changes in the erosion of those mountains is unlikely to be

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linked to changes in the summer rains. However, monsoon precipitation could impact the LHCS, and therefore, influence the erosion and sediment transport to the basin. Shubham Tripathi et al., (2017, scientific reports) could be a good reference to discuss the evolution of monsoon since 18 Ma which is also from IODP 355 results. 2. More information from Karakoram need to be present. What is its  $\delta^{18}\text{O}$  range (this will not be only a value, to be serious, we need to use a range) ? What is the history of its precipitation and sediment transportation method ? This could be a difficult question but with the  $\delta^{18}\text{O}$  curve in fig 7, one could say Karakoram contribute a lot sediment to Laxmi Basin if calculated with a sample two-end member mixing. However, if monsoon could not influence Karakoram, how could the sediment be denuded and transported to the sea ? with glacier melt water or West wind precipitation ? 3. Any further implications for earth climate evolution from tectonic activity on the Asia? Your  $\delta^{18}\text{O}$  curve looks very similar to global deep-sea oxygen curve (James Zachos et al., 2001 Science) since 17 Ma. Recently, Francis A. Macdonald et al., (2019 Science) found a strong correlation between the extent of glaciation and arc-continent collisions in the tropics through a comparison of latitudinal distribution of ice-sheets and paleogeographic position of major Phanerozoic arc-continent collisions. Do you think the tectonic activities, which control the changes of sediment sources in Arabian Sea, could be related to set the earth climate or not ? why ? 4. Is the changes of sediment sources be related to swing of turbidity channel, (therefore the deep sea fan) ? Laxmi basin is located in the eastern Arabian Sea and could only receive part of the sediment from the channel system now. But from recently study of Yu Zhaojie et al., 2019 QSR of the same cruise, it seems that the channel system could vary significantly through glacial-interglacial cycles due to sea-level variations. Hence, is that possible the swing of channel impact your sediment sources ? Therefore, it would very helpful to see a high resolution sedimentation rate in the Arabian Sea, particularly in the Laxmi basin. Did you also consider the contribution of eolian supply as many colleagues highlights eolian is important in this area?

Detail comments: 1. Page 2 line 7: You probably need more information in the age-

model. 2. Page 2 line 17: I think HCL is better as acetic acid could not destroy all the carbonate. 3. Page 2 line 39: How many samples are used to do all those analysis ? 4. Page 5 line 11: Is that possible those Sr-Nd isotopic end-members change through time ? 5. Page 5 line 1-11: It is better to integrate the Sr-Nd results from Yu Zhaojie et al., 2019 QSR even they present in a short time scale.

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Interactive comment on Solid Earth Discuss., <https://doi.org/10.5194/se-2018-132>, 2018.

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