

Review of the manuscript: “Downstream rounding rate of pebbles in the Himalaya”

Submitted to: Earth Surface Dynamics

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The study “Downstream rounding rate of pebbles in the Himalaya” by Pokhrel et al. presents a new method to quantitatively determine the fluvial transport distance of pebbles by clast roundness. Two modern rivers in the Himalayas of Nepal are used to develop the method which is then applied to recycled pebbles from the Karnali River and sedimentary deposits in the Kathmandu Basin.

I found the paper to be a very interesting and novel read. The introduction section gave a great overview of the challenges and developments in grain shape characterization. I highly appreciate that the methods are described with a great deal of detail, making it relatively easy for other researchers to replicate the method. The figures presented in the study are phenomenal, greatly aiding the reader’s understanding of the results and concepts of the study. The methodology of the study may be applied to many other catchments and sedimentary deposits around the world to gain insight into the geomorphic history of the area. The study forms a groundwork for assessing transport distances based on clast roundness which may serve as a baseline for future research to build upon.

I would recommend accepting the paper after a few corrections have been made based on the following minor comments.

General comments:

Consider using larger fonts for headings and subheadings. Personally, it helps me find where sections begin and end. The main headings in particular should be bigger to stand out from the rest of the text.

In section 4.1, it is stated (on lines 362-364) that the number of cycles of uplift, erosion and re-deposition of conglomerate pebbles can be addressed using the model, but unless I am missing something, I can’t see this discussed anywhere else in the paper. Evidence for recycling of pebbles in the Karnali River is provided later in the section, stating that some pebbles in the modern river had been rounded to an equivalent of 1472 km of transport despite the length of the river only being 660 km. This would then imply that recycling was responsible for the other ~800 km equivalent of abrasion. However, nowhere is this result translated into an estimate of how many cycles of uplift, erosion and re-deposition have occurred. Furthermore, it is not stated how the model could be used to provide such an estimate.

In my opinion, the placement of figures is sometimes a bit odd. Figure 1 is mentioned one time in the text, this being at the top of page 4, but the figure itself is shown at the bottom of page 5, far away from the mention in-text. Figures 10 and 11 share a similar issue, but more egregiously so. In this case, the first in-text mentions of figures 10 and 11 are found near the bottom of page 19, but the figures appear much later. Figure 10 is shown at the top of page 21 while figure 11 is all the way down on page 22. Since figure 10 is mentioned many times above and below the figure it is not a significant problem, however, figure 11 is only mentioned on page 19 and nowhere else, making its placement several pages below (in the Discussion section rather than Results) rather confusing. The issue with having figures placed far from their in-text mentions is that it forces the reader to scroll back and forth through the document while reading, sometimes over several pages, which is detrimental to the reading experience. Of course, a perfect layout is not always possible, but in my opinion the article would be improved if the back-and-forth scrolling could be reduced, perhaps by making some figures smaller and/or moving them around.

Line comments:

L13-14: In the abstract it is mentioned that the roundness coefficient for granite pebbles is eight times that of quartz pebbles, however, it is claimed on lines 342-343 and in the figure 7 description that the roundness coefficient for granite pebbles is seven times that of quartz pebbles. Whichever of these two stated numbers is more accurate should be used consistently throughout the paper.

L115: "...will likely influence how they pebbles round" Typo, 'they' should be 'the'.

L119: Informal language, usage of "don't" instead of "do not".

L151: I'm unsure why the spacing above and below equation 1 is uneven. Equation 4 clearly has even spacing, while I can't tell for sure with equations 2 and 3.

L175: Unnecessary space before the '~' in "(~100 m)".

L220: Missing comma after "For example".

L280-281 & L283: Almost the exact same sentence ("Granite pebbles are rounder than quartzite ones when comparing the percentiles across lithologies") is repeated twice. Was the first instance of the sentence supposed to be removed?

L349: Given the context, the word 'latter' should be used instead of 'later'.

L360-362: Consider rewording this sentence to make it easier to follow.

L367: There is a space before the '.'.

L368: "...in this region consists thick..." I believe "consists of" would be correct here.

L408: The line ends with a quotation mark, likely a typo.

L435: Given the wording of the sentence, the reference should not be in brackets but rather part of the text.

L445: There is an extra space before the closing bracket in " (IR_n) ".

L456: The sentence "We present the applicability of new roundness model to the ancient and modern sediments" doesn't quite work. Did you mean to say "...of a new...?"

I hope my comments prove helpful and I wish you the best of luck on your research.