

Interactive comment on “Impact of sediment-seawater cation exchange on Himalayan chemical weathering fluxes” by M. Lupker et al.

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I have completed my own review of this manuscript and consulted the two referee reports. Based on this, I am happy to recommend this work for publication at Earth Surface Dynamics following some revisions. Both referees highlighted that this was a timely contribution of data to help address an understudied topic. The referees appreciated the elegance of the study, and highlighted the important findings (strong role of grain size on CEC, quantification of absolute Ca²⁺, Mg²⁺, K⁺ and Na⁺ fluxes due to CEC in the Ganges-Brahmaputra system, and their relative importance to overall flux). It is very suitable for the journal and should interest a wide readership.

Some revisions are required and I fully endorse the referee reports. These are somewhere in the minor/moderate category as they may require some new text, and then

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re-ordering of text to keep the flow of the manuscript. Referee #1 makes important recommendations to consider, particularly point 2 (more clarity on how the 'probable' CEC fluxes were derived at) and point 4 (propagation of uncertainty). Points 1 (can CEC occur in the river system upstream of the estuary?) and 4 also need to be considered. Referee #2 would also like you to consider the impact of CE for ion ratios (e.g. Ca/Na) which are used to estimate dissolved ion sources in many river systems. I provide some additional comments below.

Please respond fully to the referees comments and my own when working towards a revised manuscript. Thank you for submitting this work to Earth Surface Dynamics.

Other comments (with Page:line number)

1.14: spell out that you mean river water column (i.e. with depth). Add an extra sentence here to elaborate on this finding, i.e. it is variable (from X to Y) with grain size of sediments, which varies with depth.

1.19: add 'river' before 'dissolved'

1.25: 'exchange appears to be limited when evaluated'

2.24: explain this is suspended and bed load?

3.18: do you have to monitor potential addition of Ca²⁺ to the solution as a result of adding the calcite?

3.34: explain this finding in the abstract (see comment above)

4.4: the surface sediments have higher organic matter loads. Is this coincidence (i.e. both are grain size dependent) or can organic matter be an important host/reactive surface for these cations? Some discussion would be useful.

4.13: add '%' after '1'

6.30-34: This seems like a very important finding. Higher solid:dissolved ratio (i.e.

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more turbidity) does not necessarily mean more CE. You make this point in the next paragraph too, but I wonder if it could be more clearly drawn out (and worthy of pointing out in the abstract).

Equations 4 and 5: There are ‘–’ symbols used here, which are a little confusing because I don’t think you mean ‘minus’. For instance, ‘(Na,K) – silicate’ I presume means Na K silicate mineral, not Na,K minus silicate. Same for the other equation. Reformat to make clear.

8.22: ‘is the highest point source of sediment to the oceans’

Interactive comment on Earth Surf. Dynam. Discuss., doi:10.5194/esurf-2016-26, 2016.

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