

Interactive comment on “Opposite distribution pattern of streambed hydraulic conductivity in losing and gaining stream reaches” by X. H. Chen et al.

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We thank the reviewer Dr. Kennedy for reviewing our manuscript and giving constructive comments and suggestions.

Comment: The paper compares streambed K measured in both losing and gaining reaches of the Platte River. A systematic trend of lower K in losing streams (higher K in gaining stream) is observed and attributed to near-surface sediment clogging in losing streams. The research is well planned and executed. The readability of the paper could be improved; Susa's edits provide a solid start.

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Response: We will carefully edit our manuscript and will let a professional editor review it.

Comment: I agree with Susa that more information needs to be provided with respect to classification of losing vs. gaining streams. The authors use temperature differences between surface water and groundwater to distinguish losing vs. gaining for half of the sites; the remaining four sites were determined based on “geological and hydrological settings of the study sites (P1699, L15).”

Response: Please see our response to Susan's comment for this issue. We have provided additional information in the determination of the gaining and losing conditions.

Comment: Clearly, the authors recognize the significance of hydrogeological heterogeneities in these settings, especially for reaches separated by 100 km or more. So, is it possible that the observed variations in streambed K are more an artifact of differing parent geology and/or streambed erosion/deposition than groundwater-surface water exchange patterns? At a streambed site in a gaining stream, Genereux et al. (2008) proposed erosion and deposition events as a possible control for temporal variations in K of 1- 40 m/day, a range similar to the one reported here and linked to sediment clogging. Alone, this may not explain the trend of increasing K with depth in the losing reaches, but differences in the character and rate of sediment deposition and broader evolution of the streambed may explain at least part of the variability in K between the two sets of study reaches.

Response: This is a good thought. Streambed erosion/deposition cycle can lead to temporal variation of streambed hydraulic conductivity. We will not rule out its role leading to spatial variation and we will add this point in the revision of our manuscript. However, the effect of erosion/deposition for our study sites is likely limited to a small depth. In our study sites, we determined the decreasing and increasing trends of hydraulic conductivity for several meters below the channel surface. We believe that the flow direction is a primary factor generating these opposite patterns.

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