

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

X. H. Chen et al.

xchen2@unl.edu

Received and published: 26 April 2013

We thank the reviewer Dr. Stonedahl for proving constructive comments and suggestions. We will respond here to her technical comments; we appreciate her editorial comments and will take into account these comments when we are asked to re-submit our manuscript.

Comment: This paper investigates the differences in hydraulic conductivity measurements observed in gaining and losing reaches of the Platte river and some of its tributaries. The authors collected data at 8 sites, classified four of them as gaining and

C1149

four of them as losing. They then collected around 10 vertical K distributions at each of these sites and ran some statistics on their data. I really liked their hypothesis that the “gaining” streams would have higher K values because small sediment would be pushed into the stream, and that the “losing” streams would have lower K values as the pores were clogged with sediment. This seemed very logical and I don’t know of other papers that have tried to look into this specifically.

Response: Thanks.

Comment: The classification system for determining gaining vs. losing was not consistent. Four of them were based on water temperature and the other four based on other information they already had. Considering that the classification is key to making sense out of the K values and conclusively stating there is a difference, I would have liked to have had more information about the other methods and would like to know why they didn’t use the temperature method everywhere to ensure consistency and confirm other data. This is huge, the paper falls apart if you do not believe their classifications.

Response: Among the four losing-stream sites, three sites were determined based on water and sediment temperatures. The fourth site (Spring Creek) had deep water during the field investigation and the water was muddy. The instrument was not operable for measuring the sediment temperature. However, we measured air and stream water temperatures as well as the streamwater EC value. The air and stream water temperatures were 26.5 and 22.9 (°C), and the EC value was 979 (μScm^{-1}) (we will add this information to Table 2 during manuscript revision). This EC value was about the same as the EC value of stream water in Lost Creek (a losing stream). The stream water temperature data alone from the Spring Creek site did not allow to determine the losing or gaining condition. At the Spring Creek site, we used the hydraulic head gradient method to determine the losing condition. We inserted three open-end transparent pipes to depths about 50 cm below the streambed and kept the pipes vertically in the stream for 4 hours to allow the hydraulic head inside the tubes to reach equilibrium with the flow in the streambed. The tests indicated downward movement of water in

C1150

the streambed.

At the Clear Creek site, we used the hydraulic head gradient method and the temperature method to determine the gaining condition. The two methods gave consistent results (Dong et al., 2012) and both confirmed a gaining condition in Clear Creek. But in this manuscript, we presented only the temperature data to show the gaining condition.

For the other three gaining sites in the Platte River (Clarks, Duncan, and North Bend), baseflow results generated from two groundwater flow models were used to confirm gaining conditions. Wang (2008) developed a groundwater flow model for the Platte River valley between Grand Island and Duncan and analyzed river-aquifer interactions for the period of 1956-2006. The modeling results suggest that the Platte River in this reach received baseflow at the rate of 4.7 m³/s for this period. For the North Bend site, we used the results from Chen and Ou (2013), who developed a groundwater flow model to analyze the river-aquifer interactions for the Platte River below Duncan for the period of 1950-2004. This groundwater modeling project began in 2008 and completed in 2012. Baseflow analyses from this model indicate a gaining condition for the river reach near North Bend.

In the revised manuscript, we will add the above information to clarify the approaches that were used to determine the gaining and losing conditions for these study sites.

References for this response: Chen, X., Ou, G., 2013. Development of Groundwater Flow Model for the Lower Platte North Natural Resources District Area, Nebraska. University of Nebraska-Lincoln, Lincoln, NE, USA. Unpublished Report, 110 p.

Dong, W., Chen, X., Wang, Z., Ou, G., Liu, C., 2012. Comparison of vertical hydraulic conductivity in a streambed-point bar system of a gaining stream. *Journal of Hydrology* 450-451, 9–16.

Wang, D., 2008. Impacts of Water Pumping on Base Flow Trends in Selected Streams

C1151

of Nebraska (Master's Thesis). University of Nebraska-Lincoln, Lincoln, NE, USA, 222 p.

Comment: The authors assume the reader knows which K method they have selected, but I do not believe there is a standard that everyone uses, so I would like to have more details provided about their method. This may only take a couple sentences, but it needs to be in the paper in section 2.3.

Response: We will add a short paragraph to describe the in-situ permeameter test method.

Comment: Some of the discussion is more suitable for methods or background and should be relocated, details are provided by line number.

Response: we will relocate these sentences according to your suggestions and place them to appropriate sections.

Comment: The English in this paper is pretty bad. The wrong preposition is used repeatedly and other small grammatical issues make the paper hard to read. I would suggest the authors find someone outside of their research group to read the paper and make grammatical corrections for them. I have noted some of the issues below, but I'm sure I did not catch all of them.

Response: Thank you for your careful assessment. We will make changes according to your suggestions. We will also hire a professional editor to edit this manuscript after we make a final revision.

Comment: If the authors can adequately address these concerns, I believe it will be acceptable for publication.

Response: We will address your concerns. Thanks.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 1693, 2013.

C1152