



In-stream wood enhances hyporheic exchange flows

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In streams, the water exchange between water column and hyporheic zone is crucial for many aspects of stream ecology. Interactions of the current with bed forms and solid objects on the streambed can produce vertical water fluxes across the streambed. In sand-bed streams the vertical water exchange is often low resulting in shallow hyporheic depths and low metabolic activity. In the present experimental study we compared systems with and without natural quantities of wood. In large circulating flumes we simulated a sand-bed stream with low constant slope and quantified the water exchange between water column and sediment pores by measuring the loss of diluted tracer (uranine) from the water column. The introduction of wood resulted in the development of irregular bed forms. As a result, flow resistance tripled, and the vertical water flux across the streambed increased by factors of 1.8 to 2.5 in different experiments. The overall exchange depth expanded after the introduction of wood, and the total sediment pore water volume involved in mixing increased by factors of 1.2 to 1.5. The results showed that the practice of increasing the amount of in-stream wood could be a valuable tool for hyporheic rehabilitation of degraded sand-bed streams.