Geophysical Research Abstracts, Vol. 9, 05459, 2007
SRef-ID:

Temperature influence of hyporheic geomorphology in a large, gravel-bed river: Measurements and modeling in the Clackamas River, Oregon, USA

R. Haggerty (1), B. K. Burkholder (1), G. E. Grant (2), A. Jefferson (1), P. Wampler (3) T. P. Khangaonkar (4)

(1) Dept. of Geosciences, Oregon State University, Oregon, USA, (2) USDA Forest Service, Corvallis, Oregon, USA, (3) Grand Valley State University, Allendale, Michigan, USA, (4) Pacific Northwest National Laboratory, Richland, Washington, USA, (5) (haggertr@geo.oregonstate.edu / Phone: +1-541-737-1210)

Field work and airborne thermal infrared radiometry June-October, 2006 on a 24-km reach of the Clackamas River (median discharge = 115 m^3/s; minimum mean monthly discharge = 25 m^3/s in August) revealed 45 temperature anomalies that differed 1 – 4 ˚C from the mainstem average temperature. Approximately 70% of these are due to hyporheic exchange flow (HEF), with the remainder due to groundwater inflow. Since the temperature HEF is out of phase with the main stem, these anomalies provide a cool-water flux to the river at daily peak temperature. A simple mixing model shows that the cooling effect on the main stem at daily peak temperature in summer is on the order of 0.01 ˚C/anomaly, for a total effect of approximately 0.5 ˚C under current river conditions. Work is underway to confirm this with a stream thermal transport model, and will be presented if completed. Most anomalies (53%) occur in association with currently or previously active bar channels (back-bar, cross-bar, and relict bar channels) that provide extensive, unvegetated areas of gravel conducive to HEF. In other words, the majority of HEF giving rise to temperature anomalies occurs in geomorphic and topographic positions indicative of previously channelized, open-channel, high-energy flow.