



Flow history explains temporal and spatial variation of carbon fractionation in stream periphyton

Gabriel A. Singer, Michaela Panzenböck, Gabriele Weigelhofer, Christina Marchesani, Johann Waringer, Wolfgang Wanek, Tom J. Battin

Limnol. Oceanogr., 50(2), 2005, 706-712 | DOI: 10.4319/lo.2005.50.2.0706

ABSTRACT: We investigated factors that contribute to isotopic carbon fractionation in periphytic biofilms in a human-altered headwater stream with a flashy hydrograph. Water velocity had an important effect on periphyton $\delta^{13}\text{C}$, explaining both temporal and spatial variation. We found that water velocity averaged over a certain period before sampling, rather than the instantaneous water velocity, explained a high percentage of both temporal and spatial variation of the periphyton $\delta^{13}\text{C}$ signature. The relationship between water velocity and periphyton $\delta^{13}\text{C}$ signature was particularly influenced by individual flow events during the recent flow history. A simple model based on a flow history of 3-4 weeks reliably estimated the $\delta^{13}\text{C}$ signature of periphyton from distinct reaches. The model clearly identified signature shifts caused by the deposition of activated sludge particles from a wastewater treatment plant onto the periphytic biofilms. We highlight the high spatial and temporal variability of periphyton $\delta^{13}\text{C}$ signatures (i.e., up to 3-6‰) in a heterogeneous flow environment with inputs from a wastewater treatment plant, and we explore its implications for food web analysis.

Article Links

[Download Full-text PDF](#)

[Return to Table of Contents](#)

Please Note

Articles in L&O appear in PDF format. Open access articles may be freely downloaded by anyone. Other articles are available for download to subscribers only, or may be purchased for \$10 per article. All L&O articles are moved into Open Access after three years.