



Deposition, benthic residence, and resuspension of fine organic particles in a mountain stream

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ABSTRACT: We estimated deposition and resuspension rates of natural particulate organic matter (POM) in Bloomington Creek, Idaho, a mountain stream flowing at 225 L s^{-1} . POM was collected from the water column, fractionated into two size classes—very fine POM (VFPOM, $15\text{--}52 \mu\text{m}$) and fine POM (FPOM, $53\text{--}106 \mu\text{m}$), and radiolabeled by using ^{14}C -dimethylsulfate. The labeled particles in each size class and a conservative tracer were released to the stream in metered pulses and then sampled from the water column at six stations extending 1 km downstream for 4 d. Deposition and resuspension rates were estimated by fitting a one-dimensional advection-dispersion model to ^{14}C -concentrations measured during and after release. Model-estimated deposition velocities were 0.12 ($0.09\text{--}0.16$, 95% confidence interval) and 0.18 ($0.10\text{--}0.31$) mm s^{-1} for VFPOM and FPOM, respectively. There was some ($\sim 0.05 \text{ mm s}^{-1}$) additional short-term (~ 20 min) detention of VFPOM and FPOM that may have been related to transient storage. For VFPOM, 34% of deposited particles resuspended after a mean residence time of 13 (6.9–25) h, and the remainder resuspended with a residence time of 7.5 (2.9–19) d. For FPOM, these estimates were 17%, 2.4 (1.0–4.9) h, and 2.6 (1.7–4.0) d, respectively. The weighted mean residence times and downstream velocities of particle migration were 5.1 d and 150 m d^{-1} for VFPOM, and 2.2 d and 230 m d^{-1} for FPOM. The migration velocities suggest that a significant fraction of particles exported from headwater streams travel long distances and can reach larger riverine or marine environments before mineralization.

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