The influence of particle size on seston deposition in streams

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ABSTRACT: We investigated how particle size influences deposition and transport of fine particulate organic matter in streams. Field additions of very fine (VFPOM, 15-52 µm), fine (FPOM, 53-106 µm), and medium (MPOM, 107-250 µm) detritus and live diatoms (*Asterionella* sp.) were used to quantify the longitudinal loss rate (k_p) of each material type and to derive estimates of mean transport distance (S_p) and field deposition velocity (v_{dep}). In all experiments, smaller particles deposited more slowly, and thus traveled farther, than larger size classes. Significant differences in k_p were detected in four of seven paired FPOM and VFPOM particle additions. vdep estimates were neither equivalent nor closely associated with calculated quiescent water fall velocities (v_{fall}) for all size classes. Variation in S_p and v_{dep} of FPOM and VFPOM were strongly correlated across hydrological conditions (r = 0.94 and 0.92, respectively). Variation in v_{dep} was poorly associated with physical attributes of the stream. Transport distances were positively associated with the cross-sectional area of the transient storage zone (A_s) and the uptake length of water (S_w) for both size classes. We argue that local hydrological and benthic conditions establish a minimum rate of particle deposition and that departures from this rate due to gravitational forces begin to occur at particle diameters similar to the larger size classes used in this study (50-100 µm).

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