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Aggregate particle settling from a laboratory river plume DAVID DEEPWELL, BRIANNA MUELLER, BRUCE SUTHERLAND, University of Alberta — Motivated by understanding how particles in sediment bearing river plumes ultimately settle, we present laboratory experiments of a constant-flux fresh water surface gravity current containing a low ($< 1\%$) concentration of dense particles which initially overrides a saline ambient. Two classes of experiments were performed: 1) with a uniform density saline ambient fluid and 2) a two-layer ambient fluid. In both classes of experiments, collective settling combined with ambient recirculating flows result in particles settling out predominantly as a large single vertical plume. As the plume falls, the centre of the plume travels faster than the fluid around it causing an entrainment of neighbouring particles leading to a narrowing of the plume with depth. In a two-layer stratification with micrometer-sized particles, the settling is delayed at the interface between the upper and lower layers as a result of lighter fluid being dragged down with each particle in its surrounding viscous boundary layer thereby decreasing its effective density. The width and location of the sedimentation plume as well as the enhanced settling velocity of particles in the plume is characterized with respect to particle density and concentration.

David Deepwell
University of Alberta

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