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In all but the simplest environments, attempting to understand how particle dynamic processes such as settling and aggregation affect observed optical properties is difficult, as examining hypotheses is muddled due to the presence of other ongoing processes, such as advection or local resuspension. The results presented here reinforce the use of *in situ* manipulation and idealized lab experiments where processes can be studied in isolation, as frameworks to help interpret field observations. Indeed, while we think these experiments are useful in isolating the effects of individual processes on optical properties, it is important to recognize their limitations as well. In this work, our measurements have focused on sediment-dominated systems, first near-bottom in an estuary, and second laboratory clays aggregated in salt. We expect that many of our results will be widely applicable, but must also acknowledge that in other cases such as large highly-absorbing phytoplankton aggregates, our understanding is incomplete and additional research is needed.

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