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Hydrodynamic control of phytoplankton loss to the benthos in an estuarine environment

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ABSTRACT: Field experiments were undertaken to measure the influence of hydrodynamics on the removal of phytoplankton by benthic grazers in Suisun Slough, North San Francisco Bay. Chlorophyll *a* concentration boundary layers were found over beds inhabited by the active suspension feeders *Corbula amurensis* and *Corophium alienense* and the passive suspension feeders *Marenzelleria viridis* and *Laonome* sp. Benthic losses of phytoplankton were estimated via both the control volume and the vertical flux approach, in which chlorophyll *a* concentration was used as a proxy for phytoplankton biomass. The rate of phytoplankton loss to the bed was positively correlated to the bed shear stress. The maximum rate of phytoplankton loss to the bed was five times larger than estimated by laboratory-derived pumping rates for the active suspension feeders. Reasons for this discrepancy are explored including a physical mechanism whereby phytoplankton is entrained in a near-bed fluff layer where aggregation is mediated by the presence of mucus produced by the infaunal community.

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