



## Resuspension of phytodetritus from the sea floor: A laboratory flume study

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**ABSTRACT:** Mass settling of phytoplankton can result in the accumulation of a layer of phytodetritus on the sea floor. In order to determine the fate of this organic matter, we must know whether the phytodetritus may be returned to the water column by resuspension. This study was designed to measure the critical bed shear stress ( $\tau_{\text{crit}}$ ) for resuspension of phytodetritus and to test whether  $\tau_{\text{crit}}$  differs (1) among types of phytodetritus with different phytoplankton species composition and (2) within type among ages. Phytodetritus was created from cultured *Skeletonema costatum* and from natural assemblages dominated by *Chaetoceros* spp., collected near the end of diatom blooms in Cape Cod Bay and Woods Hole, Massachusetts. Resuspension of phytodetritus decomposed 1- to 11-d was measured in a laboratory flume. Overall,  $\tau_{\text{crit}}$  for the diatom-derived detritus ranged by a factor of four (0.018- 0.068 N m<sup>-2</sup>), with significant differences in  $\tau_{\text{crit}}$  among types and ages of phytodetritus. Reasons for these differences are suggested, such as species-specific differences in size, shape, porosity, and stickiness of the detrital matrix, as well as changes in these parameters that occurred during decomposition. Values for critical shear velocity, which ranged from 0.4 to 0.6 cm s<sup>-1</sup> for *Chaetoceros*-derived detritus and from 0.5 to 0.8 cm s<sup>-1</sup> for *Skeletonema*-derived detritus, validated indirect estimates from field studies. An interesting finding with special relevance in lake and coastal systems was the importance of wave-forced resuspension, suggesting that coupling of settled phytodetritus and other sticky organic flocs to the water column is enhanced by waves.

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