Woods Hole Oceanographic Institution

Biology Department Seminar

Thursday, May 1, 2014
Redfield Auditorium – 12:00 Noon

Bacterial Chemotaxis to Individual Diatoms and Upscaling to Predict Consequences for Organic Matter

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Chemotaxis is a behavior that may affect the rate at which bacteria consume and transform phytoplankton-derived dissolved organic matter (DOM). I will present a high-resolution video microscopy approach that quantified the dynamic chemotactic accumulation of natural bacteria around individual *Chaetoceros affinis* diatoms that released DOM as a result of lysis. Bacterial 'clusters' lasted from ~1 min to 1 h, extended to a distance of ~1 mm (the 'phycosphere'), and frequently reached cell concentrations >100-fold above background. The spatiotemporal distribution of bacteria was used as input to a mathematical model that quantifies (i) the fate of DOM released from the diatom – whether used in the vicinity of the diatom or diffusing beyond the phycosphere (where non-motile bacteria dominate consumption); and (ii) the relative consumption by chemotactic and non-motile bacteria. The study provides a blueprint for the elusive goal of upscaling microbial interactions from the microscale to the ecosystem scale where they ultimately affect food webs and biogeochemistry.