

CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

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**Microbes, Patches and Plumes: Investigating Microbial Ecology with
Microfluidics**



Microorganisms are key players in determining the fluxes of the elements and energy in the Ocean. They interact with their physico-chemical environment in a number of ways, among them using motility and chemotaxis to search for and home in on nutrient sources. These sources are often localized and ephemeral (patches), resulting from the lysis of phytoplankton, sloppy feeding by zooplankton, or settling particles (plumes).

The ability of bacteria to utilize these patches hinges on the competition between the physical time scale over which the nutrient source is dissipated to background concentration, and the biological time scale required for the microbes to sense, respond to and track the patch. The relation between these time scales will ultimately determine the role of bacteria in the marine food web.

I will present novel results from microfluidic experiments designed to carefully control the evolution of patches and plumes, while at the same time capturing and quantifying both the physical and biological time scales in the problem. Our results indicate that marine bacteria can respond extremely rapidly to transient nutrient sources. Their larger speed and more efficient swimming strategy ensures they beat the enteric bacterium *E. coli* to the punch, most likely an adaptive strategy to cope with prevalent nutrient conditions in the ocean.

Tuesday – November 6, 2007
Barus & Holley, Room 190
3:00pm