Microbial degradation of organic matter and crude oil in the ocean: The importance of interfacial processes

Bacteria are the simplest organisms on Earth, yet they play an indispensable role in controlling the biogeochemistry and productivity of the oceans. These large-scale consequences result from the complex interactions between individual cells and their fluid dynamical and physical environments. In this talk, I will present experiments using microfluidics and time-lapse microscopy that directly visualize the interactions between marine bacteria and (i) model organic particles or (ii) crude oil droplets to extract critical parameters limiting these microbe mediated processes. These observations provide a new framework for understanding how the interplay between physical, chemical, and biological processes at interfaces shape the dynamics of microbial remineralization of sinking organic matter and biodegradation of crude oil in the ocean.