« The Microscale Ocean: A new frontier of microbial exploration »

Dr. Roman Stocker
ETH Zürich, Institut für Umweltingenieurwissenschaften
HIL G 37.2
Stefano-Franscini-Platz 5
8093 Zürich
romanstocker@ethz.ch

Marine microorganisms live and interact at the microscale. Yet, our knowledge of their ecosystem functions is based mostly on human-scale sampling approaches: rarely has their ecology been accessible at the level of single cells and their microenvironment, due the minute scale and dynamic nature of many microbial processes. The encounter and interaction of marine microbes with particles, gradients and resource hotspots; their utilization of organic matter point sources that diffuse and are stirred by turbulence; their ability to navigate a physically and chemically fluctuating environment, are all dynamic processes that fundamentally shape microbial ecology in the ocean, yet have largely escaped our ability to visualize, explain and quantify. I will show how the combination of microscale technology – including microfluidics and 3D printing – to create controlled yet realistic physico-chemical microenvironments both in the lab and in the sea, with real-time, single-cell imaging and image analysis provides a powerful approach to directly see, understand and quantify many microbial processes in the ocean, and ultimately to develop new models of the behavior, interactions and biogeochemical consequences of marine microbes.