# Taxon-specific and quantitative measurements of microbial biogeochemical activity with stable isotope incubations and NanoSIMS

XAVIER MAYALI[1]

[1]Lawrence Livermore National Laboratory, 7000 East Ave, Livermore CA 94550 USA, mayali1@llnl.gov

Stable isotope labeled substrate additions to track microbial biogeochemical activity are now well-accepted approaches used in nearly all ecosystems, from soils to lakes and oceans, the deep sea to the sun-lit surface, and from anaerobic to aerobic environments. Commonly used labels include $^{13}C$, $^{15}N$, $^{18}O$, and $^{34}S$, and many substrates to date have focused on the tracking of specialized microbial activities such as nitrogen fixation, methanotrophy, and so on. Most approaches still focus on qualititative results, linking microbial identity and function. Effort are now underway to examine the incorporation of substrates commonly or even ubiquitously incorporated by microbes (e.g. ammonium, amino acids), which necessitates the ability to quantify incorporation. I will discuss the use of NanoSIMS to quantify cell-specific and taxon-specific incorporation of $^{13}C$ and $^{15}N$ labeled substrates in a variety of environments. Specifically, I will conclude that controlled incubations with tested treatment effects are a valuable component of such studies which will enable us to use these isotope-enabled approaches to constrain microbial metabolic influences on ecosystem-level functions.