Feast in the deep: The use of chemosynthetic nutrients by the Tanner crab

Sarah Seabrook[1], Fabio C. De Leo[3], Andrew R. Thurber[1,2]

[1]College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, 104 CEOAS Admin Bldg. Corvallis, OR, USA; seabroos@oregonstate.edu
[2]Department of Microbiology, College of Science, Oregon State University, Corvallis, OR, USA
[3]Ocean Networks Canada/Biology Department, University of Victoria, BC, V8W 2Y2, Canada

Chemoautotrophic communities serve as an important source of energy in otherwise food limited deep-sea environments. In addition to endemic fauna, seeps provide food for non-symbiont-bearing “marauding” megafauna whose mobility can disperse energy to surrounding habitats, influencing the overall energetics of the margin beyond the seep itself. Here, we quantify the assimilation of chemosynthetic nutrients by Tanner crabs (Chionoecetes tanneri), a potential commercially important species in the NE Pacific Ocean. The Tanner crabs were collected at methane seep habitats (860 – 1300 m) among the Ocean Networks Canada cabled array. To investigate their trophic dependence on the local seep ecosystem we analyzed gut microbiome along with stable isotopic and fatty acid signatures. 16S rRNA gene sequencing revealed a diversity of microbes associated with seep and non-seep sediment within the gut of C. tanneri. This community was dominated by the sulfide-oxidizer Sulforvum, the sulfate reducers Defulfobacterium and Desulfobulbus, and the methanotroph Methylococceae. These bacteria were also found to be abundant in methane seep sediments, with negligible abundance in non-seep sediments. To determine if C. tanneri was assimilating chemosynthetically fixed energy from these microbial taxa, we will present data on biomarkers capable of quantifying the relative proportion of seep energy used by these crabs. With the expansion of deep-sea fisheries and the predicted decrease in photosynthetic production over the next century, seep production may increasingly act as a subsidy for surface production in species such as the Tanner crab, providing a trophic link between chemoautotrophy and human diets.