Oxygen Minimum Zones as Creators and Modifiers of Chemosynthetic Ecosystems

Lisa Levin

Scripps Institution of Oceanography; llevin@ucsd.edu

Low-oxygen (hypoxic) waters (< 22 umol O2) cover over 1.1 million square km of naturally occurring continental margin seabed. Such areas are now expanding with climate change. While most deep-sea biologists recognize these areas as a distinct habitat type called oxygen minimum zones, their role as chemosynthetic ecosystems are poorly understood. I will discuss how OMZs function as chemosynthetic systems and summarize evidence for chemosynthetic trophic pathways (involving microbes, symbiont bearing-taxa, and isotopic data) from Pacific, Atlantic and Indian Ocean OMZs, highlighting the potential for both aerobic and anaerobic oxidation processes to support the base of the food chain. Low faunal diversity and high density driven by physiological stress and abundant food supply are also attributes that OMZs share with other chemosynthetic ecosystems such as vents, seeps and whale falls. Overlying low-oxygen (OMZ) waters on margins also act to modify attributes of methane seep and organic fall assemblages in the Eastern Pacific, for example through control of large symbiont-bearing or habitat-forming species (bathymodiolin mussels, tubeworms, Osedax and Xylophaga), as well as control of carbonate macrofauna. Additional research is needed to improve understanding of how oxygen shapes chemosynthetic communities.