Woods Hole Oceanographic Institution

Biology Department Seminar

Thursday, October 17, 2024 – 12:00 Noon

Microbial Adaptation to Ocean Deoxygenation: A Kinetic Analysis from Coastal and Oceanic Zones

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Ocean deoxygenation is considered one of the most important threats currently occurring in marine ecosystems. Global climate change and other anthropogenic stressors have led to the expansion of open ocean oxygen deficient water layers and increase of the frequency of hypoxic or anoxic phenomena in coastal areas. Prokaryotes can use different types of terminal oxidases with a broad range of affinities for O2 during aerobic respiration, thus modulating their affinity for O2 and potentially adapting to deoxygenation events. Thus, studying respiratory kinetics provides insight into the adaptation of the microbial community to decreasing levels of O2. Here, I will present the study of respiratory kinetics of microbial communities from both coastal and oceanic environments: the seasonally anoxic water column of the Mariager Fjord, Denmark, and the oxygen minimum zone (OMZ) in the Eastern Tropical North Pacific. We measured O2 consumption rates of water samples collected at different depths in the oxycline while exposing them to a wide range of O2 concentrations from full saturation to nanomolar levels during on board incubations. Maximum respiration rates measured in coastal waters were higher than the ones measured in the OMZ. Both locations exhibited a pattern of decreasing respiration rates with increasing depth. The half saturation constant (Km) also decreased from oxic waters to hypoxic and anoxic depths, suggesting the dominant contribution of low affinity terminal oxidases in fully oxic waters and the adaptation of the community to low O2 waters with increasing use of high affinity terminal oxidases. Our data show the adaptation of the microbial community in aquatic ecosystems exposed low O2 levels, decreasing the apparent Km to increase the respiration efficiency.

HYBRID! **In Person**: Carriage House **Zoom:** https://whoi-edu.zoom.us/j/97000865816 Meeting ID: 970 0086 5816 **By phone**: Find your local number: https://whoi-edu.zoom.us/u/adIvMow3LQ