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Woods Hole Oceanographic Institution  
**Biology Department Seminar**



Thursday, August 15, 2024 – 12:00 Noon

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## **Exploring Deep Sea Biodiversity and Diel Vertical Migration with Environmental DNA**

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The deep sea, including the ocean's mesopelagic zone (or "ocean twilight zone"), harbors a vast biomass that is critically important to the global carbon cycle. However, the diversity of this biomass is understudied due to the immense size of the environment and the logistical challenges of collecting samples. More information is especially needed on diel vertical migration (DVM), where typically, many mesopelagic animals travel to surface waters to feed at night and return to mesopelagic depths for the day. This process actively expedites the downward flux of carbon. However, more information regarding the diversity, distributions, and migration patterns of these animals is needed. Environmental DNA (eDNA) metabarcoding analysis is a new approach for studying animal diversity, and can address hypotheses related to DVM, animal distributions, and ecological interactions. Comparisons with MOCNESS tows demonstrate that eDNA detects animal taxa that are missed in traditional sampling. However, deep sea animal eDNA signals are dilute and patchily distributed, creating challenges for eDNA research. I will show that despite the potential for vertical movement of genetic material, modeled and field-collected eDNA signatures appear to reflect the depth of their source, indicating that eDNA approaches are useful for studying vertical phenomena such as DVM. Consistent with this and using newly obtained reference sequences from deep sea fishes, I found a greater diversity of mesopelagic fish in surface waters at nighttime than in the daytime, as predicted. Additionally, I will describe how the application of new approaches that my laboratory is developing and implementing, including large volume autonomous sampling in combination with diverse oceanographic platforms such as the midwater AUV Mesobot and others, are revealing new insights into deep sea biodiversity and DVM.

**HYBRID! In Person:** Redfield Auditorium **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/adlvMow3LQ>