

Exploring Deep Sea Biodiversity with Environmental DNA

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The deep sea harbors a vast biomass that is critically important to the global carbon cycle and contains resources of potential interest for harvesting. However, the taxonomic and functional diversity of this biomass is understudied due to the size of the environment and the logistical challenges of collecting samples. The ocean region below 200m depth is the largest biome on our planet, extending to abyssal (6000m) depths and to 11,000m in the deepest ocean trench. Despite its relative inaccessibility, the deep sea faces threats from climate change, deep sea mining, and exploitation and more information is urgently needed for responsible stewardship. Environmental DNA (eDNA) metabarcoding analysis is a new approach for studying deep sea animal biodiversity, and can address hypotheses related to animal distributions, migrations, ecological interactions, and environmental impacts. Comparisons with net 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 surveys. Animal eDNA originates from sloughed cells, tissue fragments, fecal pellets, gametes, and other particles, and it is necessary to relate eDNA signatures to the distribution of organisms. I will discuss recent advances from my laboratory in autonomous sampling and platform technologies, the origin, dispersal and transport, and fate of eDNA, and field results from expeditions targeting deep midwater and seamount habitats.



Short biography



Dr. Annette Govindarajan is a molecular ecologist and biological oceanographer who studies the biodiversity and ecology of midwater and deep sea animals using eDNA and new sampling and robotic technologies. She is especially interested in understanding how animals are distributed over space and time and the factors controlling those distributions. Towards these ends, she develop and apply eDNA approaches and sampling technologies geared towards deep sea applications. She also study the “ecology of eDNA” to enable the interpretation of eDNA data and to relate eDNA signatures to animal distributions. She is on the OBON Scientific Advisory Committee and is active in technology, policy, and capacity building efforts for biomolecular observing.

Online profiles:

WHOI: <https://www2.whoi.edu/site/govindarajanlab/>

Google scholar. <https://scholar.google.com/citations?user=PJmScX8AAAAJ&hl=en>