

OCEAN OPTICS XXIV

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<https://oceanopticsconference.org>

Thursday, October 11

Poster Session 4

10:30–12:00

Poster 203

NOVEL TECHNOLOGY TO EXPLORE THE MESOPELAGIC OCEAN

The ocean's mesopelagic zone ($\approx 200 - 1000$ m) is largely uncharacterized despite indicators that it plays a critical role in ocean ecosystems, with a biomass estimated at 10 billion metric tons. Novel, complementary techniques are needed for exploration of the biogeochemical composition of the mesopelagic, and to better understand dynamic distributions of organisms and their relationship with surface productivity, fisheries, and biomass transfers. We have developed a vertical profiler combining acoustic and optical techniques to assess organism distribution and patchiness on a spectrum of spatial scales, filling the gap between long range ship-based acoustics and the small scales typically resolved with optical techniques. The instrumentation package consists of a next generation Spatial PLankton Analysis Technique (SPLAT) bioluminescence imaging system, Unobtrusive Multi-Static LIDAR Imager (UMSLI), Inherent Optical Properties (IOP) package, Acoustic Zooplankton Fish Profiler (AZFP), Aquadopp acoustic current meter, and EK80 - Wide Band Acoustic Transceiver (WBAT). The profiler was successfully deployed to between 300 and 500 m during a March 2018 technology-demonstration cruise aboard the NOAA Okeanos Explorer in the northern Gulf of Mexico. Data collected will be utilized to examine the propagation of mechanically stimulated bioluminescence, diel vertical migration, organism distribution and identity, small-scale turbulence and shear regimes, and bulk particulate properties. We present a quantitative data synthesis for this unique exploration system, and demonstrate the importance of an integrated approach to studies in this environment. The insights gained during this project will be invaluable for further research in the important yet under-sampled "twilight" mesopelagic zone.

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