Environmental Studies Program: Ongoing Study

Title	Atlantic Deepwater Ecosystem Observatory Network (ADEON)—An Integrated System for Long-Term Monitoring of Ecological and Human Factors on the Outer Continental Shelf (OCS) (NSL #AT-16-08a; AT-16-08b)
Administered by	Gulf of Mexico OCS Region
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Conducting Organizations(s)	University of New Hampshire; National Oceanic and Atmospheric Administration (NOAA) Southwest Fisheries Science Center
Total BOEM Cost	$4,000,000 (+co-sponsors funds)
Performance Period	FY 2016-2021
Final Report Due	September, 2021
Date Revised	June 4, 2019
PICOC Summary	Write one or two sentences for each of the following elements, as appropriate. If not appropriate, write N/A.
Problem	In the Atlantic OCS regions, ocean-observing measurements, which could help, protect and understand the environment and provide environmental time series, are rare. Baseline line studies are needed in advance of potential conventional energy, renewable energy, and marine minerals development in these frontier regions.
Intervention	Fill in the spatial gaps of an Atlantic ocean observing system by establishing a network of deep-water stations that provide time series of oceanographic, water quality, and biological measurements.
Comparison	Temporal and spatial comparisons of variability in ecosystem parameters through time-series data collection from an integrated observing system.
Outcome	Access to multi-year time series of ecosystem parameters in Atlantic deep waters for identifying any significant changes in the quality and productivity of the marine environment. Real-time access to oceanographic datasets are through public data portals.
Context	Future industrial activities in the Mid and South Atlantic OCS

BOEM Information Need(s): This is a National Oceanographic Partnership Program (NOPP) project with sponsoring agencies including BOEM, the Office of Naval Research (ONR), and NOAA, all of whom have interest in improved soundscape measurements.

Background: Sustained deep water measurements of biological, physicochemical, and human use factors are currently rare in the Mid and South Atlantic. An ecosystem-based approach is required in offshore waters that provides an integrated perspective

across multiple disciplines to enhance BOEM's role in environmental stewardship. A sustained network of deep water observatories would provide this ecosystem perspective through collection of multi-year, year-round measurements of regional processes and human use as part of an integrated system. Offshore Atlantic waters encompass a complex oceanographic regime and highly productive biological domain, as influenced by the shelf-slope break, the Gulf Stream, submarine canyons, and atmospheric/climatic forcing. The observatory will be part of the new generation of biologically-enabled ocean observing systems which can provide long-term measurements of plankton, fish, and marine mammal distributions. Passive acoustic data serves the dual purpose of providing both animal distributions and baseline soundscapes, including contributions from human activities. As well, physical oceanographic, water quality, and air quality measurements obtained from the observatory network will provide habitat data and inform BOEM's modeling capabilities and respective National Environmental Policy Act (NEPA) cumulative-impact analyses. Overall, the network will provide much needed baseline data in this region and will provide capability for monitoring long-term environmental changes and testing BOEM mitigations.

Objectives: The overarching goal of this 5-year study is to collect and analyze year-round ecological and human-use datasets to provide improved mechanistic understanding of ecosystem variability, including soundscape, and to develop a long-term monitoring presence in Mid and South Atlantic deep waters.

Methods:

The interdisciplinary objectives of this study are met through multi-year (initial 3 year) deployment of an integrated array of instrumented moorings in Mid and South Atlantic deep waters. The moorings and other observing assets are distributed from a northern extent off Virginia (Norfolk Canyon area) to a southern extent off Georgia (Blake Ridge area), with exact mooring location based on regional resources and processes of interest. Mooring instrumentation include sensors for: (1) Biology and Soundscape – prey, fish, and marine mammal species and ambient noise levels, (2) Water Quality –oxygen, chlorophyll, and nutrients, and (3) Physical Oceanography – pressure, temperature, salinity, and ocean currents. Regular ship-based support provides mooring deployment, validation sampling, and instrumentation maintenance. Finally, time series analyses are performed for all measured parameters and provide a mechanistic understanding of forcing factors (e.g., storm events, anthropogenic activities, etc.) driving variability.

Specific Research Question(s):

1) What are the major gaps in deepwater ocean observing systems that can be filled by this study?
2) How do oceanographic and other ecosystem properties change both temporally and spatially in the Atlantic OCS, including in comparison to historical datasets?
3) What are the natural and anthropogenic drivers of observed variability in these time series?

Current Status: Documents developed and available on the Atlantic Deepwater Ecosystem Observatory Network (ADEON) website include: the Soundscape and

Modeling Metadata Standard, Calibration and Deployment Good Practice Guide, Hardware Specification, and Data Processing Specification. The ADEON team successfully completed several cruises, deployed, and monitored all seven benthic bottom landers, and collected data on passive acoustic monitoring of soundscapes, active acoustic zooplankton fish profiles, and oceanographic properties. Acoustic soundscape data available at the national Center for Environmental information.

Publications Completed: N/A

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/100143

https://adeon.unh.edu/

References: N/A