

ID: W1947369448

TITLE: Exploration of the Canyon-Incised Continental Margin of the Northeastern United States Reveals Dynamic Habitats and Diverse Communities

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ABSTRACT:

The continental margin off the northeastern United States (NEUS) contains numerous, topographically complex features that increase habitat heterogeneity across the region. However, the majority of these rugged features have never been surveyed, particularly using direct observations. During summer 2013, 31 Remotely-Operated Vehicle (ROV) dives were conducted from 494 to 3271 m depth across a variety of seafloor features to document communities and to infer geological processes that produced such features. The ROV surveyed six broad-scale habitat features, consisting of shelf-breaching canyons, slope-sourced canyons, inter-canyon areas, open-slope/landslide-scar areas, hydrocarbon seeps, and *Mytilus* Seamount. Four previously unknown chemosynthetic communities dominated by *Bathymodiolus* mussels were documented. Seafloor methane hydrate was observed at two seep sites. Multivariate analyses indicated that depth and broad-scale habitat significantly influenced megafaunal coral (58 taxa), demersal fish (69 taxa), and decapod crustacean (34 taxa) assemblages. Species richness of fishes and crustaceans significantly declined with depth, while there was no relationship between coral richness and depth. Turnover in assemblage structure occurred on the middle to lower slope at the approximate boundaries of water masses found previously in the region. Coral species richness was also an important variable explaining variation in fish and crustacean assemblages. Coral diversity may serve as an indicator of habitat suitability and variation in available niche diversity for these taxonomic groups. Our surveys added 24 putative coral species and three fishes to the known regional fauna, including the black coral *Telopathes magna*, the octocoral *Metallogorgia melanotrichos* and the fishes *Gaidropsarus argentatus*, *Guttigadus latifrons*, and *Lepidion guentheri*. Marine litter was observed on 81% of the dives, with at least 12 coral colonies entangled in debris. While initial exploration revealed the NEUS region to be both geologically dynamic and biologically diverse, further research into the abiotic conditions and the biotic interactions that influence species abundance and distribution is needed.

SOURCE: PloS one

PDF URL: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0139904&type=printable>

CITED BY COUNT: 69

PUBLICATION YEAR: 2015

TYPE: article

CONCEPTS: ['Species richness', 'Seamount', 'Coral', 'Ecology', 'Submarine canyon', 'Continental shelf', 'Oceanography', 'Canyon', 'Megafauna', 'Continental margin', 'Habitat', 'Biology', 'Geology', 'Fishery', 'Paleontology', 'Pleistocene', 'Tectonics', 'Geomorphology']