

# Technical Announcement

MMS

U. S. Department of the Interior  
Minerals Management Service  
Gulf of Mexico OCS Region

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Contact: Caryl Fagot  
(504) 736-2590

## ***Foraminiferal Communities of Bathyal Hydrocarbon Seeps, Northern Gulf of Mexico: A Taxonomic, Ecologic, and Geologic Study***

### **OCS Study MMS 2009-013**

The Minerals Management Service (MMS), Gulf of Mexico OCS Region, announces the availability of a new study report, *Foraminiferal Communities of Bathyal Hydrocarbon Seeps, Northern Gulf of Mexico: A Taxonomic, Ecologic, and Geologic Study*.

The report presents the results of a study to investigate benthic foraminifera of hydrocarbon seeps. Hydrocarbon seeps ("cold seeps"), especially those of the Gulf of Mexico, have been the subject of many studies because, like hydrothermal vents ("hot vents"), they support a complex community of organisms in a chemosynthesis-based ecosystem. Benthic forams represent a very large group of shelled protists that live in seep-related substrates. This is frequently the most abundant meiofaunal group in diverse marine habitats. Foraminiferal species respond rapidly to environmental disturbances, and their large extant populations and well-preserved shells make them excellent recorders of present and past marine biodiversity.

One hundred eighty-five species of benthic foraminifera were identified in a study of sediment substrates and tubeworm surfaces in (a) Green Canyon, Garden Banks, and Mississippi Canyon (245-1081 m) and (b) Alaminos, Farnella, and DeSoto Canyons (1,848-2,918 m); the samples were obtained from submersibles in both seep and non-seep (control) areas. One hundred twenty-two species were calcareous; 63 were agglutinated.

No species found in this study is endemic to seeps, but 21 species were previously unknown in the Gulf of Mexico. Foraminiferal species of wide-ranging morphologic and taxonomic affinities are able to maintain sizeable populations at sites of hydrocarbon seepage; the high bacterial productivity at the seeps is a major factor in the sustenance of these populations. The most conspicuous dominants at seep-influenced substrates (bacterial mats) in the shallower cluster are endobenthic species, especially *Bolivina* spp.; these are possibly facultative anaerobes. The pattern is not as clear in the deepest-bathyal group because some epibenthic species (e.g., *Nuttallides decorata*) are present among the dominants. In the shallower areas, the diversity (species richness) of both calcareous and agglutinated foraminifera is higher in non-seep than in seep substrates. This distinction too is not clear in the deepest-bathyal areas. Fifteen sessile, epibenthic foraminifera colonize surfaces of vestimentiferan tubeworms (and

possibly other elevated microhabitats) at hydrocarbon seeps, centimeters to decimeters above the sediment-water interface. These attachment points are sufficiently above locations of gas escape in the seafloor to provide the species with an oxic microhabitat with little or no hydrogen sulfide. Eight of these species have been found exclusively on tubeworms in this study.

Scanning electron micrographs were taken of all species for which suitable specimens were found; some digital photomicrographs were also taken, especially of species attached to tubeworms. All of these illustrations are included in a taxonomic atlas that constitutes a major part of this report.

This report is available only in compact disc format from the Minerals Management Service, Gulf of Mexico OCS Region, at a charge of \$15.00, by referencing OCS Study MMS 2009-013. The report may be downloaded from the MMS website through the [Environmental Studies Program Information System \(ESPIS\)](#). You will be able to obtain this report also from the National Technical Information Service in the near future. Here are the addresses. You may also inspect copies at selected Federal Depository Libraries.

Minerals Management Service  
Gulf of Mexico OCS Region  
Public Information Office (MS 5034)  
1201 Elmwood Park Boulevard  
New Orleans, Louisiana 70123-2394  
Telephone requests may be placed at  
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