Gulf of Mexico Science

Volume 18
Number 1 *Number 1*

Article 8

2000

The Deep Sea is Not So Deep Any More

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DOI: 10.18785/goms.1801.08

COMMENTARY

Gulf of Mexico Science, 2000(1), pp. 72–74

THE DEEP SEA IS NOT SO DEEP ANY MORE.—The world's oceans are becoming less mysterious every day. What 20 yr ago would make for some great science fiction is now fact. One only needs to read the financial section of the newspaper, page through a copy of *Sea Technology* and the *Oil and Gas Journal*, or look at some of the research being announced in the *Commerce Business Daily* to see the rewriting of our oceanographic text books. This thirst for new knowledge has created a shortage of remotely operated vehicles for daily operations in the deep sea, an immediate need for autonomous underwater vehicles, and the existence of floating industrial platforms in the Gulf of Mexico with control centers similar to the National Aeronautics and Space Administration's "mission control."

While worldwide discussions centered on $30-a-barrel oil, the petroleum industry in the Gulf of Mexico has been pushing the technological edge of the envelope. Working in water depths that would impress even Jules Verne, the industry has been exploring and developing deeper and deeper oil and gas resources at an unprecedented pace. This venture was made possible by a combination of the passage of the Deepwater Royalty Relief Act in 1995 and the development of technologies that have allowed for cost-effective development beyond the continental shelf.

As the agency responsible for the orderly development of our offshore energy and mineral resources, we at the Minerals Management Service (MMS) accept and, in fact, are already successfully meeting this new challenge. Despite this rapid development into the deepwater frontier, we will continue to ensure the same type of environmental protection currently afforded the continental shelf. To answer the critical need for an adequate information base in these frontier areas, MMS has taken an aggressive posture toward deepwater science.

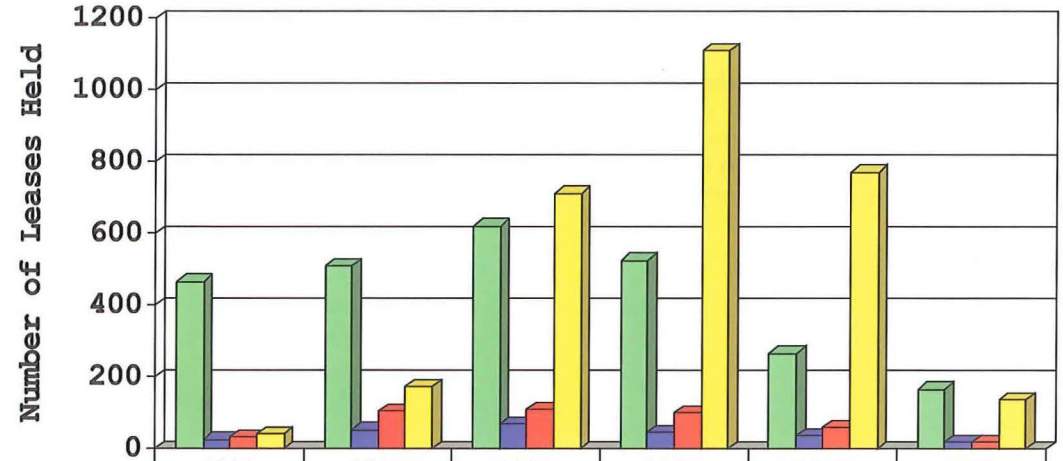
Examining our past accomplishments, we can see, to some extent, a parallel between this new deepwater trend and MMS-sponsored studies conducted since the mid-1980s—including research of the deep sea in general and research in chemosynthetic communities and marine mammals in particular. However, if today's predictions of even larger reservoirs of oil and gas are proven true, the Gulf of Mexico will experience a profound change in energy resource development patterns during the next decade.

In recent years, the oil and gas industry has leased tracts in depths greater than 3,000 m, has drilled wells in water depths greater than 2,350 m, and has established development installations in depths over 1,600 m. The following graphic illustrates this movement by the oil and gas industry into deeper waters in the western and central Gulf of Mexico.

In fact, most exploratory and development drilling is now occurring in water depths from 450 to 1,500 m, and of the 7,600 leases active today, over half are in water depths greater than 200 m. Such intense, long-term industrial activity has the potential to affect deepwater communities. Oil spills, although highly unlikely, would have an unknown effect in the deepwater environment. Research is under way to improve spill trajectory models and impact assessment in deep waters. Also of concern and currently under study are physical disturbances from facility emplacement, potential toxic effects from disposal of various materials, and suffocation by drilling muds and formation.

As early as the mid-1980s, researchers recognized the possibility of chemosynthetic species in the Gulf from dredge and trawl tows. Analyses confirmed these findings, and MMS followed up by providing funding for submersible observations in 1986. These observations revealed the magnitude of these communities, their faunal composition, spatial variability, and their relationships among the fauna, bacterial mats, seeps, and unusual geological forms. These faunal assemblages quickly revealed striking parallels to other distant chemosynthetic communities at tectonic spreading centers, the habitats associated with the first known and most celebrated chemosynthetic communities at the Galapagos Rift. Soon after the first Louisiana slope discoveries, additional communities were found during separate submersible dives to the base of the Florida Escarpment (~3,000 m) and in the Alaminos Canyon (>2,000 m). Subsequently, MMS funded two major field studies on chemosynthetic communities.

Recognizing the implications of this suite of studies to the accelerated movement of industry into deeper water, MMS and Louisiana State University hosted the Workshop on Environmental Issues Surrounding Deepwater Oil



	1994	1995	1996	1997	1998	1999
<200 m	466	509	620	525	265	165
200-400 m	25	52	66	44	35	16
400-800 m	30	103	110	99	58	17
>800 m	39	171	712	1110	771	135

Fig. 1. Number of leases held by oil and gas industry, 1994–1999.

and Gas Development during the spring of 1997. Workshop participants identified physical oceanographic, sociological, geological, and ecological data gaps and recommended new investigations to fill them.

In accordance with the guidance and recommendations of the workshop, we led an effort to narrow the acknowledged gap between industrial deepwater activity and information availability. Soon a highly focused studies program was developed through discussions with the stakeholders of offshore development, the formation of government/industry work groups, and cooperative efforts with academia. Currently, the program is investigating several issues to address potential environmental, socioeconomic, and ecological impacts of this new movement into deepwater areas, such as (a) the adequacy of an aging infrastructure; (b) the potential for use conflicts; (c) the influxes of immigrant labor into small communities for the first time; (d) the storage and handling of new chemicals; and (e) studies in physical oceanography, dispersion and deposition, toxicity, chemosynthetic communities, and protected and endangered species.

To continue this trend of cutting-edge science, MMS is planning another workshop in 2002 to review the successes and shortcomings resulting from our 1997 meeting and to plan for any needed additional studies.

Concurrent with our studies, we initiated a deepwater strategy procedure for dealing with the more day-to-day aspects of deepwater activities. This strategy is a proactive approach to managing operations, to ensuring appropriate environmental review, and to further focus research efforts as technology and procedures evolve. Key elements of this strategy are requirements for Deepwater Operations Plans (DWOPs) and preparations of Environmental Assessments (EAs) on deepwater operations, associated support activities, and infrastructure.

The DWOP was established to address the different functional requirements of equipment in deep water (particularly the safety system requirements associated with subsea development systems) and the complexities and unique types of fixed and floating production facilities. The DWOP allows MMS and industry to identify very early in the process any new issues specific to deepwater operations. In many instances, the technologies and procedures being used rival those of the launch of a new space vehicle.

The EA process allows for the consideration of any and all environmental issues at the beginning of the planning stage. The objectives of the EA are to identify and evaluate the significance of potential environmental and socioeconomic impacts from deepwater operations and activities, to develop appropriate mit-

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igation measures if needed, and to identify information gaps.

Through evolving programs such as these and the sponsoring of new research in the physical, ecological, and socioeconomic sciences, MMS will continue to meet its responsibility of managing the untapped mineral resources of the deep Gulf that are so vital to the security of our nation.

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