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METHANE HYDRATE RESOURCE ASSESSMENT OF THE OUTER CONTINENTAL SHELF: IN-PLACE GULF OF MEXICO RESULTS

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ABSTRACT

The U.S. Minerals Management Service has completed a preliminary assessment of in-place gas hydrate resources in the Gulf of Mexico. A probabilistic model built on a mass balance approach to assessment provides a high degree of spatial resolution and supports detailed mapping. The model produces a Monte Carlo distribution of in-place resources that ranges from 314 trillion to 974 trillion cubic meters (TCM) with a mean value of 607 TCM. Additional work on development of a technically recoverable model component is under way.

Keywords: gas hydrates, resource assessment, Gulf of Mexico, model, marine

INTRODUCTION

The Minerals Management Service (MMS) is a U.S. Department of the Interior bureau charged with managing the nation's natural gas, oil, and other mineral resources on the U.S. Outer Continental Shelf (OCS). Recently, the MMS launched an effort designed to provide an assessment of the natural gas hydrate resource potential across the entire OCS, including the Alaskan, Atlantic, Gulf of Mexico, and Pacific margins. The principal objective of this ongoing project is to deliver, in succession, a probabilistic evaluation of in-place, technically recoverable, and economically recoverable gas hydrate resources.

The framework for in-place analysis was developed first for the Gulf of Mexico (GOM) because of our deep understanding of the GOM petroleum system and the abundance of geological and geophysical data available to us, all of which is attributable to the GOM's maturity as a conventional oil and gas province. The total endowment of *conventional* oil and gas resources in the U.S. GOM is judged to exceed 150 billion barrels of oil equivalent.

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Unlike MMS conventional oil and gas assessments on the OCS, which are performed using a geologic play-based approach, the MMS gas hydrate assessment model employs mass balance calculations. Mass balance analysis applied to each model cell provides a level of spatial resolution that supports detailed mapping. While other possible methodologies exist, mass balance has several important advantages: it is transparent and it allows extreme variable disaggregation. As new or improved information becomes available the system can be easily updated.

The general in-place model structure is composed of a charge module, a container module, and a concentration module. Outputs from these three modules feed into an integration module that produces principal output variables.

When run for the GOM (figure 1), the MMS gas hydrate assessment model produces an empirical distribution for in-place hydrates by Monte Carlo simulation. The distribution ranges from 314 trillion to 974 trillion cubic meters (TCM) at the 95% to 5% fractiles, respectively, with a mean in-place volume of 607 TCM. This phase of the project deals solely with identified *in-place* gas hydrate resources. Modeling of technically recoverable hydrate resources is underway, and modeling of economically recoverable resources will follow.

For a complete description of the model methodology, underlying assumptions, and input datasets, the reader is encouraged to read MMS Report 2008-004 at:

http://www.mms.gov/revaldiv/GasHydrateAssessment.htm

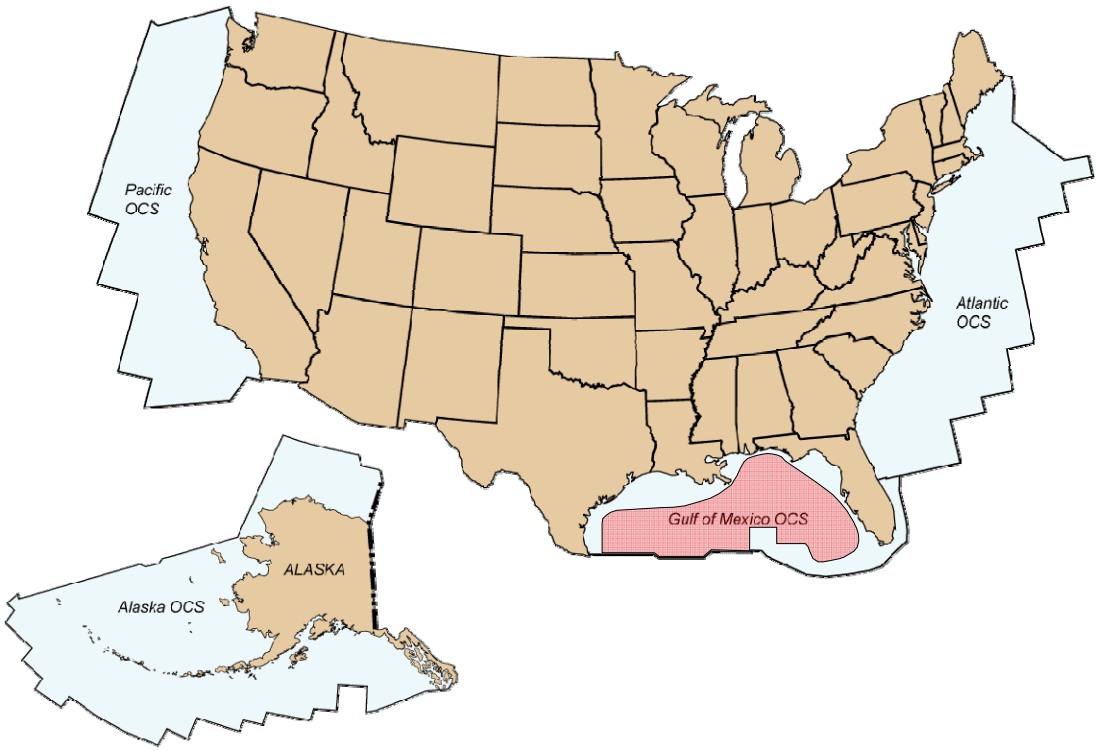

Figure 1. U.S. Gulf of Mexico study area outlined in red.