

Oil & Natural Gas Technology

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Quarterly Research Performance Progress Report

(Period ending 09/30/2014)

Advanced Hydrate Reservoir Modeling Using Rock Physics Techniques

10/1/2012 – 9/30/2015

Submitted by:

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Executive Summary

This research effort focuses on developing and refining techniques that integrate rock physics modeling, amplitude analysis, and spectral decomposition to characterize complex gas hydrate reservoirs. The expected outcome of the research efforts will be an enhanced ability to quantitatively evaluate and prioritize potential gas hydrate accumulations that may be selected as exploration drilling targets based on 3-D seismic data.

Preliminary work has been done, but in order to meet the research project objectives, suitable 3D seismic data that contain gas hydrate deposits are required. Work has been essentially halted until appropriate 3D seismic is made available to the project.

Accomplishments to date

- Reviewed related scientific/industry research efforts.
- Identified relevant research concepts.
- Investigated well logs data in WR 313 and GC955
- Selection of initial rock physics model.
- Progress on selection of possible statistical classification techniques.
- Contact with communities of interest after the award announcement. USGS, Colombian Petroleum Institute, KIGAM, Guanzhou Marine Geological Survey, Shell, BP, Chevron, Petronas, National University of Singapore, and Texas A&M University
- Continued professional development for Dr. Zhang, building on recent past work.
- Received in-kind contribution Jason Workbench Suite of petrophysical and inversion software to develop analytical routines.
- Purchased Hampson Russell AVO and inversion software that can be used in this project
- Modeling mixtures of methane and thermogenic gas hydrate signatures against flux and geothermal gradients and depositional architecture.
- Presentation of Poster showing research progress at Gordon Research Conference in March, 2014.
- Researched attenuation concepts
- Preparation of oral talk for International Conference on Gas Hydrates.
- Negotiated donation of seismic lines in WR 313 and GC955 by CGG for use in this project.
- Presented oral talk at International Conference on Gas Hydrates in Beijing

Progress, Results, and Discussion Summary of technical progress

The project was postponed for the period January 1, 2013 to September 30, 2013. Task Groups 1 (Project Management and Planning) and 2 (Project Initiation) were completed prior to this reporting period. Work was also done on Task Group 3 (Development of Project Research Concepts) prior to the work hiatus. The project restarted with continuation of work within Task Group 3 and Task Group 4. Because of difficulties getting permission to use 3D seismic data in the area of interest, a no-cost extension was granted that extends the research project until September 30, 2015.

At this time we are conserving time spent on the project until suitable 3D data are made available.

At this time we have two arbitrary seismic lines from WR 313 and GC 955 from CGG. The project has permission to use these for research purposes until June 2015. These data, however do not go through the gas hydrate deposits and CGG was unwilling to supply equivalent data that do.

We are trying to get permission to use the Western Geco (Schlumberger) data that were supplied for DOE Chevron Gulf of Mexico Gas Hydrate Leg II project.

We have not identified suitable gas hydrate deposits in Fugro-owned seismic data, but will keep looking.

Another potential action is to approach Pemex and IMP for research collaboration. Meetings are expected in January 2015 to discuss potential collaboration. If this avenue for progress seems feasible, then we will approach DOE about adding additional scientists from Mexico onto the project.

Future work in next reporting period

- Continue to work to secure the 3-D seismic volumes for testing and calibration. Discussions progressed during the period without any commitment to providing data.
- Proceed with project once suitable data are made available.

Changes or Problems

We have still not secured sufficient 3D seismic data from GC955 and WR313 for this project. CGG has made parts of those volumes available to Oklahoma State University for related hydrate research in the same DOE funding cycle. We were finally able to get a research donation contract for seismic data from CGG for WR313 and GC955 on May 30, 2014. The data were received in June, 2014. Unfortunately, the data are limited to single lines extracted from the 3D volumes. The data for WR313 consist of a single E-W oriented line approximately 300 m south of the north block line. The data received in GC955 is a single SW-NE line in the southeast quadrant of the block. Neither line intersects the hydrate deposits discovered during JIP Leg II that are the focus of this study. We will look to other multienterprise seismic vendors that may have 3D seismic data in WR313 and GC955.

Software and work commitments from CGG are still outstanding issues. CGG has indicated that it is likely to not support the project with Jason Workbench software and technical advice.

Except for the no-cost time extensions, and the lack of suitable data to proceed, there are no significant changes or problems with the direction of the project as originally proposed. However, the work will be diminished in direct application to any coring of the JIP Leg II locations if suitable 3D seismic data are not made available to this project.

Participants and Other Collaborating Organizations

	Zijian Zhang, Geophysicist, Fugro Employee	Dan McConnell, Principal Investigator, Fugro Employee	Peter Mesdag, Technical Advisor, ex Fugro now after divestiture a CGG Employee (Netherlands)
Nearest month worked this reporting period	0	0	0
Collaboration outside USA	Not this reporting period	Not this reporting period	None this reporting period
Travel outside USA to communities of interest	None this reporting period	None this reporting period	None this reporting period

Special Reporting Requirements

None this quarter.

Budgetary Information

A new budget has been calculated for the remaining time on the contract.

\$72,224 has been spent from a budget allocation of \$213,444 to date. The federal share of the costs to date is \$57,779 and the cost sharing is \$14,445. The federal share of the costs per this reporting period is \$0 and the cost sharing is \$0.

Exhibit I Milestone Status

Milestone 1, Task 1 was completed November 14, 2012

Milestone 2 is on hold until suitable data are available.

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