Oil & Natural Gas Technology

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Quarterly Research Performance Progress Report (Period ending 12/31/2012)

RECONSTRUCTING PALEO-SMT POSITIONS ON THE CASCADIA MARGIN USING MAGNETIC SUSCEPTIBILITY

Project Period (10/1/12 to 9/30/13)
Submission Date: 1/31/13
Submitted by:
Joel E. Johnson, Associate Professor
joel.johnson@unh.edu, 603-862-4080

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Signature

University of New Hampshire
DUNS #: 111089470
51 College Rd. Durham, NH 03824

Office of Fossil Energy

Quarterly Research Performance Progress Report (Period ending 12/31/2012)
PROJECT TITLE: RECONSTRUCTING PALEO-SMT POSITIONS ON THE CASCADIA MARGIN USING MAGNETIC SUSCEPTIBILITY

2. ACCOMPLISHMENTS:

What are the major goals of the project?
The main goals of this project are to:

(1) Reconstruct the paleo-positions of the Sulfate-Methane Transition (SMT) using a magnetic susceptibility (χ) and grain size proxy approach in gas hydrate –bearing sediment cores collected on the Cascadia continental margin during ODP Leg 204 and IODP Exp. 311.

(2) In collaboration with Oregon State University, the Recipient shall utilize gas hydrate systems specific *CrunchFlow* reactive transport modules to ultimately model the required methane and sulfate fluxes that best explain the paleo-positions of the SMT at sites on both the northern and central Cascadia margin.

(3) The overall effort shall provide the gas hydrate community with a proven geologically well-preserved proxy for paleo-SMT reconstructions, and thus allow the use of the magnetic susceptibility (χ) paleo-SMT record to assess the natural variability in methane and sulfate fluxes in marine gas hydrate bearing regions.

What was accomplished under these goals?
For the first quarterly reporting period the following tasks have been completed at the following levels and the project is on schedule, consistent with our project management plan (PMP). The tasks described below are all efforts toward the completion of the first goal stated above.

(1) Task 1, as stated in the Statement of Project Objectives SOPO: *Project Management and Planning*: *Project Management Plan 100% completed.*

(2) Task 2 in the SOPO: *Obtaining X-ray fluorescence elemental data from the cores*: *20% completed*.
The proposal to request lab access time in the XRF core scanning facility at the IODP Core Repository in College Station Texas and the strategy for determining the scanning resolution given the length of our sediment records was completed and approved. During the next reporting period graduate student Phillips is scheduled to travel to College Station, TX to use this facility from Feb. 4 -18, 2013. During this time, the elemental scans of the cores will be completed.

(3) Task 3 in the SOPO: *Obtaining Sediment Samples from the Cores 100% Completed*
Sediment samples from the cores were requested through a sample request document sent to the IODP core repository in College Station, TX. This request was approved and the samples were collected on our behalf by the curatorial staff and shipped to UNH. During the next reporting period discrete sample measurements on these core samples will begin. These measurements include: grain size, CHNS elemental analysis, magnetic mineralogy, and age models.

(4) Task 4 in the SOPO: *Obtain and Set-up Laser Particle Size Analyzer at UNH 100% Completed*
The Malvern Mastersizer 2000 laser particle size analyzer was purchased, installed, and is operating in the sedimentology lab at UNH. We have established and tested sediment type specific protocols and began testing pre-treatment procedures (to eliminate inorganic and organic

carbon) so we can obtain the lithogenic-only grain size distributions in our samples. During the next reporting period we will complete our grain size measurement for this project.

What opportunities for training and professional development has the project provided?
The set-up of the Mastersizer 2000 Laser Particle Size Analyzer and testing of sediment type specific protocols and pre-treatment procedures has provided the opportunity for student training in the sedimentology lab at UNH. Specifically, one Ph.D. graduate student (Phillips) and our sedimentology laboratory manager have both learned to use the instrument, develop the protocols, and run standards in preparation for the analyses of the project samples.

How have the results been disseminated to communities of interest?
PI Johnson presented a project overview talk via Webex to DOE Gas Hydrate research program managers and Oregon State University Researchers on Oct. 29, 2012.

What do you plan to do during the next reporting period to accomplish the goals?
During the next reporting period graduate student Phillips is scheduled to travel to College Station, TX to use the XRF Core Scanning facility from Feb. 4 -18, 2013. During this time, the XRF elemental scans of the cores will be completed. During the next reporting period discrete sample measurements on the project core samples will also begin. These measurements include: grain size, CHNS elemental analysis, magnetic mineralogy, and age models.

3. PRODUCTS:

What has the project produced?
Nothing to report.

4. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS:

Who has been involved?
Project Personnel
PI Joel Johnson
Ph.D. Student Stephen Phillips

What individuals have worked on the project?

Name:	**Joel Johnson**
Project Role:	PI
Nearest person month worked:	1
Contribution to Project:	Developed the revised Statement of Project Objectives and the Project Management Plan, facilitated the procurement, set-up, and testing of the particle size analyzer, helped develop the core sediment sample request proposal, and the XRF core scanning access proposal.
Funding Support:	This project (UNH cost share)
Collaborated with individual in foreign country:	No
Country(ies) of foreign collaborator:	NA
Travelled to foreign country:	No
If traveled to foreign country(ies), duration of stay:	

Name:	**Stephen Phillips**
Project Role:	Ph.D. graduate student
Nearest person month worked:	3
Contribution to Project:	Implemented the set-up and testing of the particle size analyzer, including sample specific protocol development and standards, led the development of the core sediment sample request proposal, and the XRF core scanning access proposal.
Funding Support:	This project
Collaborated with individual in foreign country:	No
Country(ies) of foreign collaborator:	NA
Travelled to foreign country:	No
If traveled to foreign country(ies), duration of stay:	

What other organizations have been involved as partners?
Nothing to report.

Have other collaborators or contacts been involved?

Nothing to report

5. IMPACT:

What is the impact of the project? How has it contributed?
Nothing to report.

What is the impact on the development of the principal discipline(s) of the project?

Nothing to report.

What is the impact on other disciplines?
Nothing to report.

What is the impact on the development of human resources?
The set-up of the Mastersizer 2000 Laser Particle Size Analyzer and testing of sediment type specific protocols and pre-treatment procedures has provided the opportunity for student training in the sedimentology lab at UNH. Specifically, one Ph.D. graduate student (Phillips) and our sedimentology laboratory manager have both learned to use the instrument, develop the protocols, and run standards in preparation for the analyses of the project samples.

What is the impact on physical, institutional, and information resources that form infrastructure?
The procurement and set-up of the Malvern Mastersizer 2000 Laser Particle Size Analyzer in the sedimentology lab at UNH provides not only the project specific measurement capabilities, but also long-term training opportunities for undergraduate and graduate students at UNH. The

particle size analyzer is a common and essential tool for characterizing marine sediments and the hydrodynamic processes responsible for their deposition.

What is the impact on technology transfer?
Nothing to report.

What is the impact on society beyond science and technology?
Nothing to report.

What dollar amount of the award's budget is being spent in foreign country(ies)?
Nothing to report.

6. CHANGES/PROBLEMS:

Nothing to report.

7. SPECIAL REPORTING REQUIREMENTS:

Nothing to report.

8. BUDGETARY INFORMATION:

The first quarter budget summary is shown in the table below. Compared to the original base line cost plan set forth in the Project Management Plan (PMP), the project expenses are less than the baseline cost by only $32.52.

EXHIBIT 2- COST PLAN

Baseline Reporting Quarter	Budget Period 1 (Oct. 1, 2012-Sept. 30, 2012)	
	Quarter 1 10/1/12-12/31/12	
	Quarter 1	Cumulative Total
Baseline Cost Plan		
Federal Share	67698	67698
Non-Federal Share	18636.2	18636.2
Total Planned	86334.2	86334.2
Actual Incurred Cost		0
Federal Share	67665.48	67665.48
Non-Federal Share	18636.2	18636.2
Total Planned	86301.68	86301.68
Variance		0
Federal Share	-32.52	-32.52
Non-Federal Share	0	0
Total Planned	-32.52	-32.52

National Energy Technology Laboratory

626 Cochrans Mill Road
P.O. Box 10940
Pittsburgh, PA 15236-0940

3610 Collins Ferry Road
P.O. Box 880
Morgantown, WV 26507-0880

13131 Dairy Ashford Road, Suite 225
Sugar Land, TX 77478

1450 Queen Avenue SW
Albany, OR 97321-2198

Arctic Energy Office
420 L Street, Suite 305
Anchorage, AK 99501

Visit the NETL website at:
www.netl.doe.gov

Customer Service Line:
1-800-553-7681