NATIONAL ENERGY TECHNOLOGY LABORATORY

DOE Award No.: DE-FE0023919

Quarterly Research Performance Progress Report

(Period Ending 09/30/24)

Deepwater Methane Hydrate Characterization & Scientific Assessment

Project Period 6: 11/15/23 - 09/30/25

Submitted by:

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Signature

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U.S. DEPARTMENT OF ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY

Office of Fossil Energy

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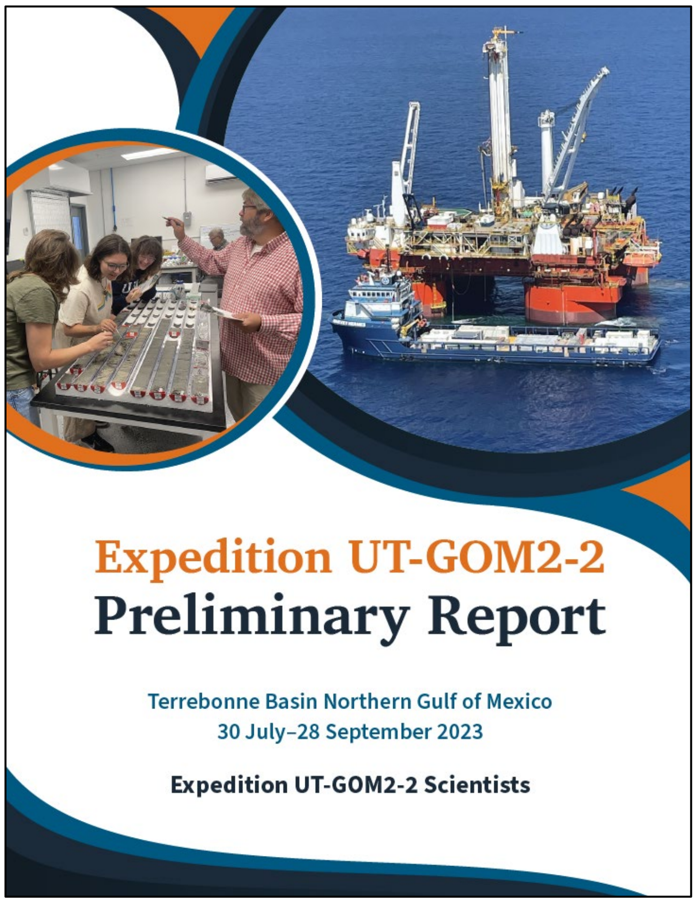
DISCLAIMER

1 ACCOMPLISHMENTS

This report outlines the progress of the fourth quarter of the tenth fiscal year of the project from Jul. 1 – Sep. 30, 2024 (Budget Period 6, Year 1). Highlights from this period include:

- The UT-GOM2-2 Preliminary Report was published:
  - Website: UT-GOM2-2
  - Zenodo: 10.5281/zenodo.13648253
  - OSTI: 10.2172/2439982



- A proposal to host a dedicated hydrates session at AGU fall meeting was accepted (*OS029: Natural Gas Hydrate Systems: Occurrence and Dynamic Behavior*). The session will be chaired by project members Ann Cook (OSU) and Alejandro Cardona (UT). Thirty-seven abstracts were submitted, 17 of which are related to UT-GOM2-2.
- Steve Phillips and Broden Grimm of USGS visited the UT Pressure Core Center to sample conventional and conventionalized cores from WR313.
- After extensive engineering tests to optimize our testing protocol, UT has resumed testing pressure core in the effective stress permeameter.

1.1 Major Project Goals

The primary objective of this project is to gain insight into the nature, formation, occurrence and physical properties of methane hydrate-bearing sediments for the purpose of methane hydrate resource appraisal. This was accomplished through the planning and execution of a state-of-the-art drilling, coring, logging, testing and analytical program that assess the geologic occurrence, regional context, and characteristics of marine methane hydrate deposits in the Gulf of Mexico Continental Shelf. Project Milestones are listed in Table 1-1 and Table 1-2.

Table 1-1. Previous Milestones

Budget Period	Milestone	Milestone Description	Estimated Completion	Actual Completion	Verification Method
1	M1A	Project Management Plan	Mar-15	Mar-15	Project Management Plan
	M1B	Project Kick-off Meeting	Jan-15	Dec-14	Presentation
	M1C	Site Location and Ranking Report	Sep-15	Sep-15	Phase 1 Report
	M1D	Preliminary Field Program Operational Plan Report	Sep-15	Sep-15	Phase 1 Report
	M1E	Updated CPP Proposal Submitted	May-15	Oct-15	Phase 1 Report
	M1F	Demonstration of a Viable Pressure Coring Tool: Lab Test	Sep-15	Sep-15	Phase 1 Report
2	M2A	Document Results of BP1/Phase 1 Activities	Dec-15	Jan-16	Phase 1 Report
	M2B	Complete Updated CPP Proposal Submitted	Nov-15	Nov-15	QRPPR
	M2C	Scheduling of Hydrate Drilling Leg by IODP	May-16	May-17	Report directly to DOE PM
	M2D	Demonstration of a Viable Pressure Coring Tool: Land Test	Dec-15	Dec-15	PCTB Land Test Report, in QRPPR
	M2E	Demonstration of a Viable Pressure Coring Tool: Marine Test	Jan-17	May-17	QRPPR
	M2F	Update UT-GOM2-2 Operational Plan	Feb-18	Apr-18	Phase 2 Report
3	M3A	Document results of BP2 Activities	Apr-18	Apr-18	Phase 2 Report
	M3B	Update UT-GOM2-2 Operational Plan	Sep-19	Jan-19	Phase 3 Report
4	M4A	Document results of BP3 Activities	Jan-20	Apr-20	Phase 3 Report
	M4B	Demonstration of a Viable Pressure Coring Tool: Lab Test	Feb-20	Jan-20	PCTB Lab Test Report, in QRPPR
	M4C	Demonstration of a Viable Pressure Coring Tool: Land Test	Mar-20	Mar-20	PCTB Land Test Report, in QRPPR

5	M5A	Document Results of BP4 Activities	Dec-20	Mar-21	Phase 4 Report
	M5B	Complete Contracting of UT-GOM2-2 with Drilling Vessel	May-21	Feb-22	QRPPR
	M5C	Complete Project Sample and Data Distribution Plan	Jul-22	Oct-21	Report directly to DOE PM
	M5D	Complete Pre-Expedition Permitting Requirements for UT-GOM2-2	Mar-23	Jul-23	QRPPR
	M5E	Complete UT-GOM2-2 Operational Plan Report	May-21	Sep-21	QRPPR
	M5F	Complete UT-GOM2-2 Field Operations	Jul-23	Sep-23	QRPPR

Table 1-2. Current Milestones

Budget Period	Milestone	Milestone Description	Estimated Completion	Actual Completion	Verification Method
6	M6A	Document Results of BP5 Activities	Mar-23	-	Phase 5 Report
	M6B	Complete Preliminary Expedition Summary	Mar-23	Sep-24	Report directly to DOE PM
	M6C	Initiate comprehensive Scientific Results Volume	Jun-24	-	Report directly to DOE PM
	M6D	Submit set of manuscripts for comprehensive Scientific Results Volume	Sep-25	-	Report directly to DOE PM

1.2 What Was Accomplishments Under These Goals

1.2.1 Previous Project Periods

Tasks accomplished in previous project periods (Phases 1, 2, 3, 4, and 5) are summarized in Table 1-3, Table 1-4, Table 1-5, Table 1-6, and Table 1-7.

Table 1-3. Tasks Accomplished in Phase 1

PHASE 1/BUDGET PERIOD 1	
Task 1.0	**Project Management and Planning**
Task 2.0	**Site Analysis and Selection**
Subtask 2.1	*Site Analysis*
Subtask 2.2	*Site Ranking / Recommendation*
Task 3.0	**Develop Operational Plan for UT-GOM2-2 Scientific Drilling Program**
Task 4.0	**Complete IODP Complimentary Project Proposal**
Task 5.0	**Pressure Coring and Core Analysis System Modifications and Testing**
Subtask 5.1	*PCTB Scientific Planning Workshop*
Subtask 5.2	*PCTB Lab Test*
Subtask 5.3	*PCTB Land Test Prep*

Table 1-4. Tasks Accomplished in Phase 2

PHASE 2/BUDGET PERIOD 2	
Task 1.0	**Project Management and Planning**
Task 6.0	**Technical and Operational Support of Complimentary Project Proposal**
Task 7.0	**Continued Pressure Coring and Core Analysis System Modifications and Testing**
Subtask 7.1	*Review and Complete NEPA Requirements for PCTB Land Test*
Subtask 7.2	*PCTB Land Test*
Subtask 7.3	*PCTB Land Test Report*
Subtask 7.4	*PCTB Modification*
Task 8.0	**UT-GOM2-1 Marine Field Test**
Subtask 8.1	*Review and Complete NEPA Requirements for UT-GOM2-1*
Subtask 8.2	*UT-GOM2-1 Operational Plan*
Subtask 8.3	*UT-GOM2-1 Documentation and Permitting*
Subtask 8.4	*UT-GOM2-1 Marine Field Test of Pressure Coring System*
Subtask 8.5	*UT-GOM2-1 Marine Field Test Report*
Task 9.0	**Develop Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 9.1	*Review and Complete NEPA Requirements for Core Storage and Manipulation*
Subtask 9.2	*Hydrate Core Transport*
Subtask 9.3	*Storage of Hydrate Pressure Cores*
Subtask 9.4	*Refrigerated Container for Storage of Hydrate Pressure Cores*

Subtask 9.5	*Hydrate Core Manipulator and Cutter Tool*
Subtask 9.6	*Hydrate Core Effective Stress Chamber*
Subtask 9.7	*Hydrate Core Depressurization Chamber*
Task 10.0	**UT-GOM2-1 Core Analysis**
Subtask 10.1	*Routine Core Analysis (UT-GOM2-1)*
Subtask 10.2	*Pressure Core Analysis (UT-GOM2-1)*
Subtask 10.3	*Hydrate Core-Log-Seismic Synthesis (UT-GOM2-1)*
Task 11.0	**Update Science and Operational Plans for UT-GOM2-2 Scientific Drilling Program**
Task 12.0	**UT-GOM2-2 Scientific Drilling Program Vessel Access**

Table 1-5. Tasks Accomplished in Phase 3

PHASE 3/BUDGET PERIOD 3	
Task 1.0	**Project Management and Planning**
Task 6.0	**Technical and Operational Support of CPP Proposal**
Task 9.0	**Develop Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 9.8	*X-ray Computed Tomography*
Subtask 9.9	*Pre-Consolidation System*
Task 10.0	**UT-GOM2-1 Core Analysis**
Subtask 10.4	*Continued Pressure Core Analysis (UT-GOM2-1)*
Subtask 10.5	*Continued Hydrate Core-Log-Seismic Synthesis (UT-GOM2-1)*
Subtask 10.6	*Additional Core Analysis Capabilities*
Task 11.0	**Update Science and Operational Plans for UT-GOM2-2 Scientific Drilling Program**
Task 12.0	**UT-GOM2-2 Scientific Drilling Program Vessel Access**
Task 13.0	**Maintenance and Refinement of Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 13.1	*Hydrate Core Manipulator and Cutter Tool*
Subtask 13.2	*Hydrate Core Effective Stress Chamber*
Subtask 13.3	*Hydrate Core Depressurization Chamber*
Subtask 13.4	*Develop Hydrate Core Transport Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.5	*Expansion of Pressure Core Storage Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.6	*Continued Storage of Hydrate Cores from UT-GOM2-1*
Task 14.0	**Performance Assessment, Modifications, and Testing of PCTB**
Subtask 14.1	*PCTB Lab Test*
Subtask 14.2	*PCTB Modifications/Upgrades*
Task 15.0	**UT-GOM2-2 Scientific Drilling Program Preparations**
Subtask 15.1	*Assemble and Contract Pressure Coring Team Leads for UT-GOM2-2 Scientific Drilling Program*
Subtask 15.2	*Contract Project Scientists and Establish Project Science Team for UT-GOM2-2 Scientific Drilling Program*

Table 1-6. Tasks Accomplished in Phase 4

PHASE 4/BUDGET PERIOD 4	
Task 1.0	**Project Management and Planning**
Task 10.0	**UT-GOM2-1 Core Analysis**
Subtask 10.4	*Continued Pressure Core Analysis (GOM2-1)*
Subtask 10.5	*Continued Hydrate Core-Log-Seismic Synthesis (UT-GOM2-1)*
Subtask 10.6	*Additional Core Analysis Capabilities*
Subtask 10.7	*Hydrate Modeling*
Task 11.0	**Update Science and Operational Plans for UT-GOM2-2 Scientific Drilling Program**
Task 12.0	**UT-GOM2-2 Scientific Drilling Program Vessel Access**
Task 13.0	**Maintenance and Refinement of Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 13.1	*Hydrate Core Manipulator and Cutter Tool*
Subtask 13.2	*Hydrate Core Effective Stress Chamber*
Subtask 13.3	*Hydrate Core Depressurization Chamber*
Subtask 13.4	*Develop Hydrate Core Transport Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.5	*Expansion of Pressure Core Storage Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.6	*Continued Storage of Hydrate Cores from UT-GOM2-1*
Subtask 13.7	*X-ray Computed Tomography*
Subtask 13.8	*Pre-Consolidation System*
Task 14.0	**Performance Assessment, Modifications, and Testing of PCTB**
Subtask 14.1	*PCTB Lab Test*
Subtask 14.2	*PCTB Modifications/Upgrades*
Subtask 14.3	*PCTB Land Test*
Task 15.0	**UT-GOM2-2 Scientific Drilling Program Preparations**
Subtask 15.3	*Permitting for UT-GOM2-2 Scientific Drilling Program*

Table 1-7. Tasks Accomplished in Phase 5

PHASE 5/BUDGET PERIOD 5	
Task 1.0	**Project Management and Planning**
Task 10.0	**UT-GOM2-1 Core Analysis**
Subtask 10.4	*Continued Pressure Core Analysis (UT-GOM2-1)*
Subtask 10.5	*Continued Hydrate Core-Log-Seismic Synthesis (UT-GOM2-1)*
Subtask 10.6	*Additional Core Analysis Capabilities*
Subtask 10.7	*Hydrate Modeling*
Task 11.0	**Update Science and Operational Plans for UT-GOM2-2 Scientific Drilling Program**
Task 12.0	**UT-GOM2-2 Scientific Drilling Program Vessel Access**
Task 13.0	**Maintenance and Refinement of Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 13.1	*Hydrate Core Manipulator and Cutter tool*
Subtask 13.2	*Hydrate Core Effective Stress Chamber*
Subtask 13.3	*Hydrate Core Depressurization Chamber*
Subtask 13.4	*Develop Hydrate Core Transport Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.5	*Expansion of Pressure Core Storage Capability for UT-GOM2-2 Scientific Drilling Program*
Subtask 13.6	*Continued Maintenance and Storage of Hydrate Pressure Cores from UT-GOM2-1*
Subtask 13.7	*Maintain X-ray CT*
Subtask 13.8	*Maintain Preconsolidation System*
Subtask 13.9	*Transportation of Hydrate Core from UT-GOM2-2 Scientific Drilling Program*
Subtask 13.10	*Storage of Hydrate Cores from UT-GOM2-2 Scientific Drilling Program*
Subtask 13.11	*Hydrate Core Distribution*
Task 14.0	**Performance Assessment, Modifications, and Testing of PCTB**
Subtask 14.4	*PCTB Modifications/Upgrades*
Subtask 14.5	*PCTB Land Test III*
Task 15.0	**UT-GOM2-2 Scientific Drilling Program Preparations**
Subtask 15.3	*Permitting for UT-GOM2-2 Scientific Drilling Program*
Subtask 15.4	*Review and Complete NEPA Requirements*
Subtask 15.5	*Finalize Operational Plan for UT-GOM2-2 Scientific Drilling Program*
Task 16.0	**UT-GOM2-2 Scientific Drilling Program Field Operations**
Subtask 16.1	*Execute UT-GOM2-2 Field Program*
Optional Subtask 16.2	*Add Conventional Coring*
Optional Subtask 16.3	*Add Spot Pressure Coring*
Optional Subtask 16.4	*Add Second Hole at H-Location*
Optional Subtask 16.5	*Add Additional Cores and Measurements*
Task 17.0	**UT-GOM2-2 Core Analysis**
Subtask 17.1	*Routine UT-GOM2-2 Core Analysis*
Optional Subtask 17.2	*UT-GOM2-2 Expanded Core Analysis*

1.2.2 *Current Project Period*

Current project period tasks are shown in Table 1-8.

Table 1-8. Current Project Tasks

PHASE 6/BUDGET PERIOD 6	
Task 1.0	**Project Management and Planning**
Task 13.0	**Maintenance and Refinement of Pressure Core Transport, Storage, and Manipulation Capability**
Subtask 13.1	*Hydrate Core Manipulator and Cutter tool*
Subtask 13.2	*Hydrate Core Effective Stress Chamber*
Subtask 13.3	*Hydrate Core Depressurization Chamber*
Subtask 13.6	*Continued Storage of Hydrate Cores from UT-GOM2-1*
Subtask 13.7	*Maintain X-ray CT*
Subtask 13.8	*Maintain Preconsolidation System*
Subtask 13.10	*Storage of Hydrate Cores from UT-GOM2-2 Scientific Drilling Program*
Subtask 13.11	*Hydrate Core Distribution*
Task 16.0	**UT-GOM2-2 Scientific Drilling Program Field Operations**
Subtask 16.6	*Post-Expedition Permitting*
Task 17.0	**UT-GOM2-2 Core Analysis**
Task 18.0	**Project Data Analysis and Reporting**
Subtask 18.1	*Sample and Data Distribution and Archiving*
Subtask 18.2	*Collaborative Post-Field Project Analysis of Geologic Data and Samples*
Subtask 18.3	*Scientific Results Volume and Technical Project Presentations*

1.2.2.1 Task 1.0 – Project Management & Planning

1.2.2.1.1 *Coordinate the overall scientific progress, administration and finances of the project:*

- UT monitored and controlled the project budget, scope, and schedule.
- UT finalized planning for an in-person UT-GOM2-2 post-cruise science workshop, which will be held in Borne, TX Oct. 27-30, 2024.

1.2.2.1.2 *Communicate with project team and sponsors:*

- UT organized UT-GOM2-2 science meetings to advance UT-GOM2-2 post-cruise science, analytical, and reporting efforts.
- UT organized sponsor and stakeholder meetings.
- UT organized task-specific working meetings, as needed, to plan and execute project tasks per the Project Management Plan and Statement of Project Objectives.
- UT managed SharePoint sites, email lists, the project website, and the UT-GOM2-2 expedition website.

1.2.2.1.3 *Coordinate and supervise service agreements:*

- UT monitored and validated subcontractor workplans and deliverables.

1.2.2.1.4 *Coordinate subcontractors:*

- UT continued to monitor and control subaward and contractor efforts.
- A new subcontract was executed between UT and New Mexico Tech, P.I. Rachel Coyte

1.2.2.2 Task 13.0 – Maintenance & Refinement of Pressure Core Transport, Storage, & Manipulation Capability

1.2.2.2.1 *Subtask 13.1 – Hydrate Core Manipulator and Cutter Tool*

Mini-PCATS was used to x-ray, p-wave scan, and cut a sample from GOM2-1 Core H005-8FB-1 for testing. The sample was transferred to the Hydrate Effective Stress Chamber. The remainder of the core was transferred back to pressurized storage and will be used for cutting tests in Mini-PCATS. The cutting system was removed and cleaned for the future cutting tests with H005-8FB-1. The system was pressure tested successfully after cleaning. The X-ray system underwent quarterly calibration.

1.2.2.2.2 *Subtask 13.2 – Hydrate Core Effective Stress Chamber*

In previous quarters, UT focused on improving our ability to perform uniaxial strain tests (i.e., samples undergo deformation only along the axial direction). UT identified that incorrect estimates of sample geometry, unaccounted apparatus compressibility, and software issues are all potential sources of error. In this quarter, to remedy these effects, UT conducted calibration tests using steel samples and well-known clay material. We have now reduced our radial deformation to less than 0.1%.

UT identified that the use of fresh water dissolves the hydrate in pressure cores. This occurs during pressure core storage (pressure core degradation) and during permeability measurements. To mitigate this issue, UT built and tested a pressure vessel that mixes methane and water, creating a fluid saturated with methane, and thus reducing hydrate dissolution (Figure 1-1a). A critical aspect of this design is that we minimize the risk of hydrate formation by mixing methane and water at a pressure and temperature outside hydrate stability. The selected mixing temperature and pressure results in a fluid saturated at the same solubility concentration of pressure core conditions (Figure 1-1b). This methane-saturated fluid is transferred through a coil tube in the UT Pressure Core Center cold room, which served as a heat exchanger. Finally, the fluid mixture is pressurized with the inlet pump before being introduced into the Hydrate Core Effective Stress Chamber.

UT used core 8FB-1 from expedition UT-GOM2-1 to test the methane-saturated water setup and conducted a permeability experiment. Results of this test successfully showed that the influent and effluent flow are fully saturated with methane and that the permeability remains constant, indicating the absence of hydrate dissolution inside the core.

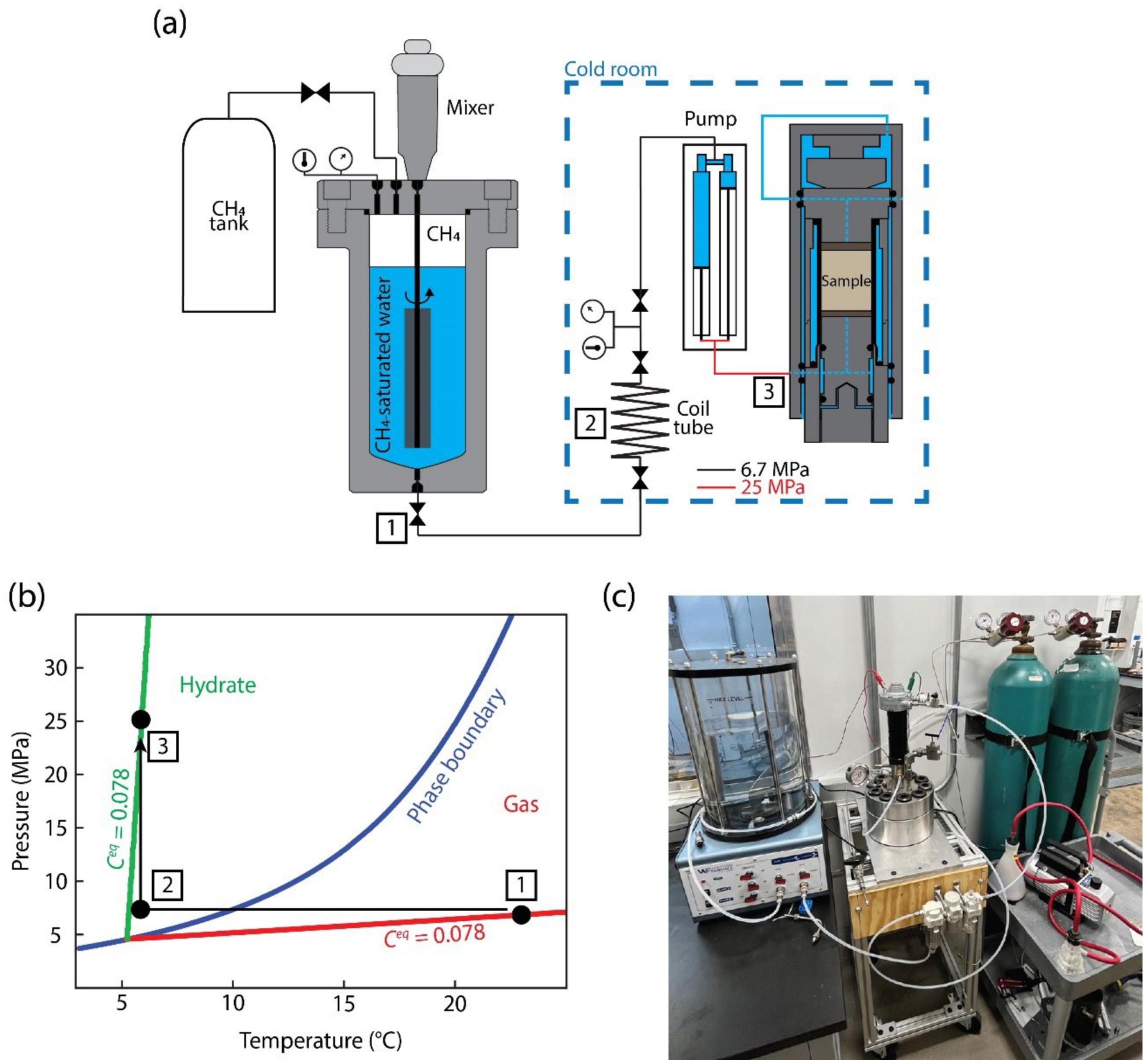


Figure 1-1 (a) The methane-water mixing vessel is located outside the cold room and pressurized to 6.8 MPa (Point 1). The fluid is transferred into the cold room (Point 2) and pressurized to 25 MPa (Point 3) (b) Pressure and temperature path of the methane-saturated fluid. Point 1, 2 and 3 match locations in (a). The phase boundary is shown as a blue line, and the CH4 isosolubility curves for C^{eq}=0.078 mol/kg are shown in red (free gas) and green (hydrate). (c) Photo of the mixing vessel located outside the cold room.

1.2.2.2.3 *Subtask 13.3 – Hydrate Core Depressurization Chamber*

The system is in standby mode and ready for use.

1.2.2.2.4 *Subtask 13.6 – Continued Storage of Hydrate Cores from UT-GOM2-1*

The UT Pressure Core Center continues to accommodate the four remaining pressure cores from UT-GOM2-1 as well as the 13 pressure cores collected during UT-GOM2-2.

1.2.2.2.5 *Subtask 13.7 – Maintain X-ray Computed Tomography*

The X-Ray CT continues to operate as designed.

1.2.2.2.6 *Subtask 13.8 – Maintain Pre-Consolidation System*

The system will continue to be evaluated to ensure proper pressure maintenance to generate effective stresses in pressure cores.

1.2.2.2.7 *Subtask 13.10 – Storage of Hydrate Cores from UT-GOM2-2 Scientific Drilling Program*

The UT PCC continues to maintain hydrate-bearing pressure cores at 6°C and connected to the pressure maintenance system, which supplies one-way high-pressure water into the pressure storage chambers. The pressure cores continue to maintain stable storage pressures.

1.2.2.2.8 *Subtask 13.11 – Hydrate Core Distribution*

Future task.

1.2.2.3 Task 16.0 – UT-GOM2-2 Scientific Drilling Program Field Operations

1.2.2.3.1 *Subtask 16.6 – Post-Expedition Permitting*

UT completed and submitted three final UT-GOM2-2 reports for the Bureau of Safety and Environmental Enforcement (BSEE), listed below:

1. Final Core Reports for WR313 H002 and H003
2. Final Paleontology Reports for WR313 H002 and H003
3. Final Geochemistry Reports for WR313 H002 and H003

All federal permitting obligations for the UT-GOM2-2 hydrate coring expedition in Walker Ridge 313 are now complete.

1.2.2.4 Task 17.0 – UT-GOM2-2 Core Analysis

Work ramped up on maximizing the amount of science resulting from the UT-GOM2-2 expedition. Efforts are reported by discipline and cover two may areas of research: characteristics of the shallow sand, mud, and ooze intervals; and characteristics of the deep hydrate-bearing sands. Both inform our understanding of hydrate formation and carbon cycling locally, in the basin, and more generally in the Gulf of Mexico.

1.2.2.4.1 *Background Geology*

- A summary of the background geology of the Terrebonne Basin and Walker Ridge Block 313 (WR313) Site H was finalized for the Preliminary Report.
- Ohio State built a synthetic seismogram for WR313-H using the USGS 2D dataset over WR313. A previous synthetic log was built for this borehole, but it was generated from lower-resolution 3D data. The 2D dataset was used to map key reflectors, such as the boundary between marine muds and carbonate oozes across the basin (Figure 1-2, columns C and D).

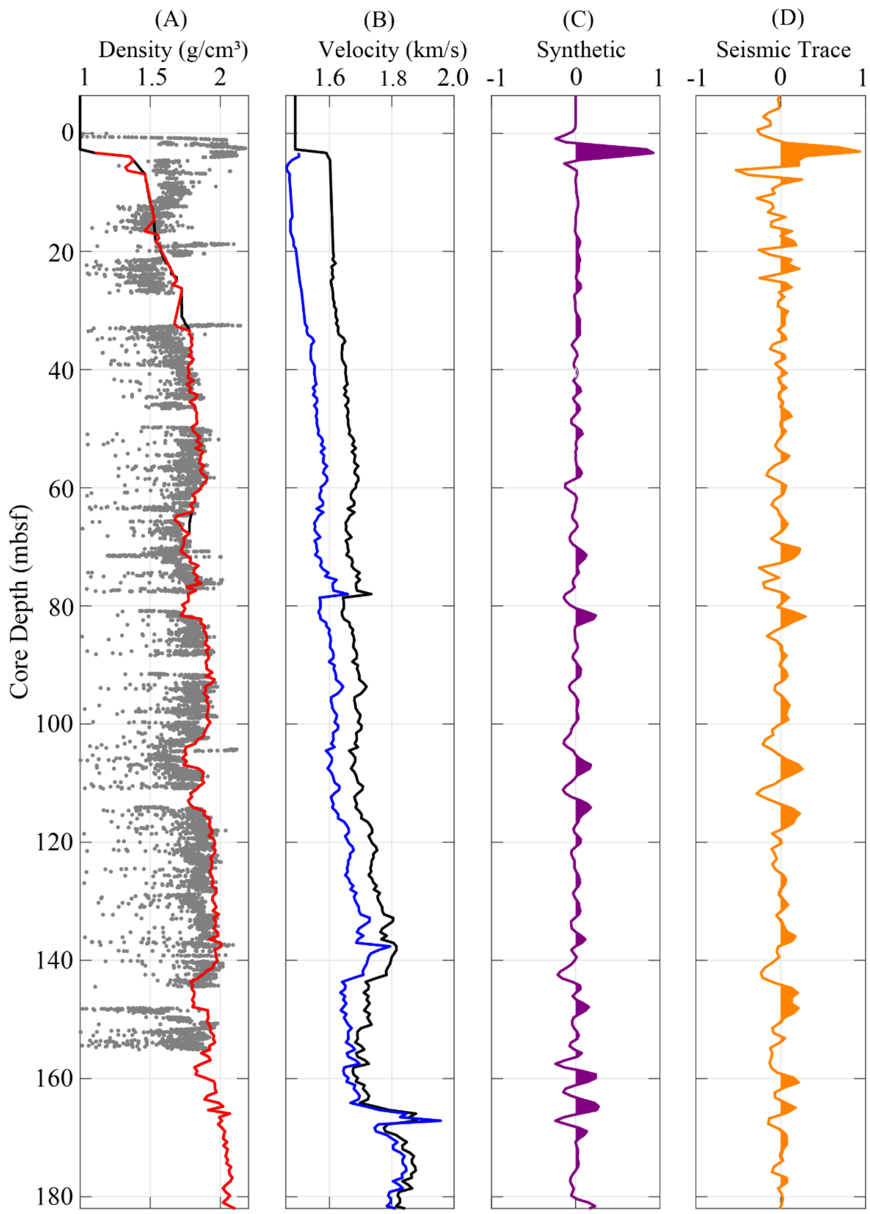


Figure 1-2. Comparison of the H001 Logging while drilling and UT-GOM2-2 core data to the new 2D synthetic seismogram for the upper 180 mbsf. A. Whole core logging bulk density data from UT-GOM2-2 cores (gray dots) and LWD density (original- red line and corrected-black line). Low density intervals reflect layers of oozes. B. LWD P-wave velocity data (original- blue line and corrected-black line). C. Synthetic Seismogram (purple line). D. 2D Seismic trace (orange line).

1.2.2.4.2 *Pressure Coring Tool Assessment*

UT continued working on the assessment of the pressure coring tool performance during the expedition comparing pressure and temperature data from various sensors inside the Pressure Coring Tool with Ball Valve (PCTB) and outside on the wireline to rig and wireline data collected as part of the mud logging program. UT submitted an abstract and prepared materials for their AGU24 poster titled: Pressure Coring in the Terrebonne Basin, Gulf of Mexico.

1.2.2.4.3 *Lithostratigraphy*

- The initial assessment of the Lithostratigraphy, including defined lithofacies and lithologic units, was reworked and finalized for the Preliminary Report. A more expansive review will be presented in the Proceedings Volume.
- UNH master's student Kayla Tozier defended her thesis. Her thesis is titled: Investigating Late Pleistocene to Recent Bimodal Sedimentation in the Terrebonne Basin, Gulf of Mexico. Kayla also prepared a poster for AGU24 titled: Investigating Late Pleistocene to Recent Bimodal Sedimentation in the Terrebonne Basin, Gulf of Mexico.
- UNH prepared and completed the petrography of 18 UT-GOM2-2 thin sections. Thin sections were stained for higher resolution. Thin sections show increased levels of small feldspars which are too small to be seen in the smear slide results. UNH also completed SEM and EDS analyses of 4 UT-GOM2-2 samples to determine mineralogy. UNH submitted an abstract and prepared materials for an AGU24 poster on the Petrography and SEM results titled: Stratigraphy, sediment composition, and provenance of Pleistocene strata of the Terrebonne Basin, northern Gulf of Mexico.
- Ohio State began investigating the source of the sandy top at WR313-H. Ohio State submitted an abstract and prepared materials for an AGU24 poster titled: An Unusual Seafloor Sand in the Terrebonne Basin, Gulf of Mexico. UNH is also looking at sources and has dated the sandy sediment as being deposited in the last 100 years.

1.2.2.4.4 *Biostratigraphy*

- UT continues to assess calcareous nannofossils as markers for the age of UT-GOM2-2 sediments and sediment deposition rates. UT submitted an abstract and prepared materials for an AGU24 poster titled: High-resolution Calcareous Nannofossil Biostratigraphy in the Terrebonne Basin, northern Gulf of Mexico. Deposition rates can impact methanogenesis.
- USGS gathered benthic foraminifera from mud sediments (sample code ISO) to measure the isotopic ratios of oxygen ($\delta 18O$) and carbon ($\delta 13C$) in their shells. Isotopic rations provide insight into the seawater and porewater conditions present while the foraminifera were still living. USGS also came to UT to collect more ISO samples from intervals where not enough foraminifera were found.

1.2.2.4.5 *Physical Properties*

1.2.2.4.5.1 Thermal Conductivity, In-Situ Temperature, and Thermal Gradient

- UT identified some future experiments to measure the thermal conductivity of reconstituted sediments from UT-GOM2-2 needed to confirm the applicability of thermal conductivity measurements made on gaseous depressurized cores for assessing the thermal gradient.
- UT continued investigating possible reasons for the differences in predicted thermal gradients between the UT-GOM2-2 in-situ measurements and the predicted BSR from seismology. UT submitted an abstract

and prepared materials for an AGU24 poster on the Predictions of the thermal gradient titled: Heat Flow in the Terrebonne Basin, Gulf of Mexico: Establishing the Gas Hydrate Stability Zone.

1.2.2.4.5.2 Core Logging and Imaging

- Geotech previously provided extremely high-resolution X-ray Computed Tomography (XCT) files of each core section of ~15 GB each. Ohio State cropped and reduced the file size of each XCT image dataset and put them online on SharePoint for easier downloading. Each core section was also visually inspected and briefly described so that further work could be done linking this dataset to other core data.
- UT continued updating core logs created with the software package Strater. Logs were updated based on corrections to the core log including missing samples, corrected sample depths, etc. Final logs will be published in the expedition proceedings volume.

1.2.2.4.5.3 Strength and Compression Behavior

- Ohio state began comparing measurements of undrained shear strength on gaseous depressurized UT-GOM2-2 cores to expected in-situ strength. Ohio State submitted an abstract and prepared materials for an AGU24 poster titled: Sediment Shear Strength Properties within the Hydrate Stability Zone: Results from the Gulf of Mexico Deepwater Hydrate Coring Expedition, Terrebonne Basin, Gulf of Mexico.
- Tufts University completed Constant Rate of Strain consolidation tests on 29 UT-GOM2-2 intact samples from whole round cores. Tufts submitted an abstract and prepared materials for an AGU24 poster on these initial results titled: Characterization of the compressive behavior of sediment in the Terrebonne Basin, Gulf of Mexico.
- Tufts successfully made 10 resedimented samples from whole round blended material and started training on triaxial testing in preparation for testing them.

1.2.2.4.5.4 Index Properties

- Tufts finished all the water submersion density testing of the whole round samples and completed about 1/3 of the gas pycnometer density measurements on the split core plugs.
- Tufts selected and submitted UT-GOM2-2 samples to James Hutton for X-ray powdered diffraction to identify minerals and clays.

1.2.2.4.5.5 Rock Magnetism

- USGS continued compiling and comparing results from the various measurements of rock magnetics conducted during the expedition including magnetic susceptibility of whole round cores, magnetic susceptibility of the split core surface and magnetic susceptibility measurements of discrete samples of both background muds and muds with anomalous readings.

1.2.2.4.6 *Dissolved Methane Concentration and Hydrate Saturation*

- USGS continued to refine their analysis of the build-up of dissolved methane in sediments from the seafloor down from pressure core quantitative degassing results. USGS submitted an abstract and prepared materials for an AGU24 talk: Accumulation of microbial methane in hemipelagic sediments of the Terrebonne Basin, northern Gulf of Mexico.
- Ohio State also reviewed X-ray Computed Tomography (XCT) files of each core to look for signs of hydrate dissociation. Ohio State submitted an abstract and prepared materials for an AGU24 poster titled: Insights from X-ray computed Tomography on Core from the Terrebonne Basin, Gulf of Mexico
- Both these results, combined with pore water geochemistry, will help fine tune the shallowest depth where hydrate might form.

1.2.2.4.7 *Microbiology*

- During this period and earlier Oregon State used ultra-low level DNA extraction techniques developed under this project to extract DNA from a subset of UT-GOM2-2 sediment. Oregon State conducted community characterization of that DNA including determination of community organization traits for specific samples. Oregon State submitted an abstract and prepared materials for an AGU24 poster titled: Microbial Distribution in Methane Hydrate-Containing Deep Sea Sediments in the Terrebonne Basin, Gulf of Mexico. Results were presented at a seminar at the University of Alaska – Anchorage.
- Oregon State corresponded with other microbiologists who received samples from 2023 expedition at Walker Ridge 313 Site H. Among those other teams, Dauphin Island Sea Lab, University of South Alabama reported that they conducted initial single-cell genomics experiments with GoM2-2 samples to calibrate their system. JAMSTEC was still experiencing delays due to the training required for a new technician to operate the computerized cell counts system.
- Oregon State acquired CosmosID for use in the classification of microbial taxa obtained from Site H and modeling predicted functionality of these taxa.

1.2.2.4.8 *Geochemistry*

- UW was able to get their equipment working again and conducted chemical analyses of pore water samples, drilling seawater, drilling mud, and PCATS fluid from the GOM2-2 scientific ocean drilling expedition.
- UW completed the analysis of chloride concentrations in all the water samples by potentiometric titration with $AgNO_3$, and completed the analysis of sulfate, bromide, and chloride concentrations by ion chromatography. They were planning to measure pore water minor element concentrations on an inductively coupled plasma – optical emission spectrometer, but that instrument has been down for much of the last year and will not be back in operation in the near future. In response to this situation, UW developed a method to analyze the pore fluid samples for minor element concentrations and PCATS tracer concentration (lithium, boron, strontium, barium, rubidium, silica, and Cs) via inductively coupled

plasma – mass spectrometry. This newly developed method is for the Agilent 7900 quadrupole ICP-MS housed in the Trace Lab in the School of Oceanography at UW.

- UW completed the analysis of 80% of the samples collected during GOM2-2 for minor element concentrations. In addition to the aqueous phase analyses, they also continued sediment leaching experiments to characterize the sediment trace metal concentrations (Fe, Mn, Ni, Co, Cr, Cu) and associated solid phases with depth in Hole H003. The pore water trace metal concentration analyses were finished in early 2024. The coupled sediment and pore water trace element concentration profiles will be powerful for understanding the cycling of these metals, which are critical micronutrients for methanogens and methanotrophs regulating methane production and consumption in marine sediments.
- UW submitted an abstract and prepared materials for their AGU24 poster titled: Geochemical Constraints on the Genesis of Methane Hydrates in the Terrebonne Basin, Gulf of Mexico.
- New Mexico Tech continued working on Nobel gas interpretation from Nobel gas analysis completed at Ohio State. NMT submitted an abstract and prepared materials for an AGU24 poster titled: Using Noble Gas Tracers to Constrain the Residence Time of Methane Gas Hydrates in the Gulf of Mexico.
- UNH completed sample preparation for ~450 UT-GOM2-2 sediment samples. Total Organic Carbon, Calcium Carbonate ($CaCO_3$), Total Nitrogen, Total Sulfur, delta 13C isotope, and delta 34S isotope measurements will be run on these samples. These analyses will provide insight into processes such as organoclastic sulfate reduction (OSR) and anaerobic oxidation of methane (AOM) occurring in the sediment. UNH submitted an abstract and prepared materials for an AGU24 poster titled: Sediment Geochemistry and Early Diagenesis in the Terrebonne Basin, Gulf of Mexico.

1.2.2.5 Task 18.0 – Project Data Analysis and Reporting

1.2.2.5.1 *Subtask 18.1 – Sample and Data Distribution and Archiving*

- A material transfer agreement between UT and USGS was started to allow the transfer of sediment samples collected in this and future periods to USGS.
- No additional sample or data requests were received. All data is available to the science team via password protected websites. When the full expedition report is published the data will be archived and made public.

1.2.2.5.2 *Subtask 18.2 – Collaborative Post-Field Project Analysis of Geologic Data and Samples*

UT-GOM2-2 Preliminary Report

- The UT-GOM2-2 Preliminary Report was published and is now available at the following sites:
  - UT Expedition Website: UT-GOM2-2
  - Zenodo: 10.5281/zenodo.13648253
  - OSTI.gov: osti.gov/biblio/2439982.

- This report provides an initial look at the results from the UT-GOM2-2 hydrate coring expedition in Walker Ridge 313, including scientific background and motivation, operations summary, and preliminary scientific results. It will later be included as a chapter in the UT-GOM2-2 Proceedings Volume.

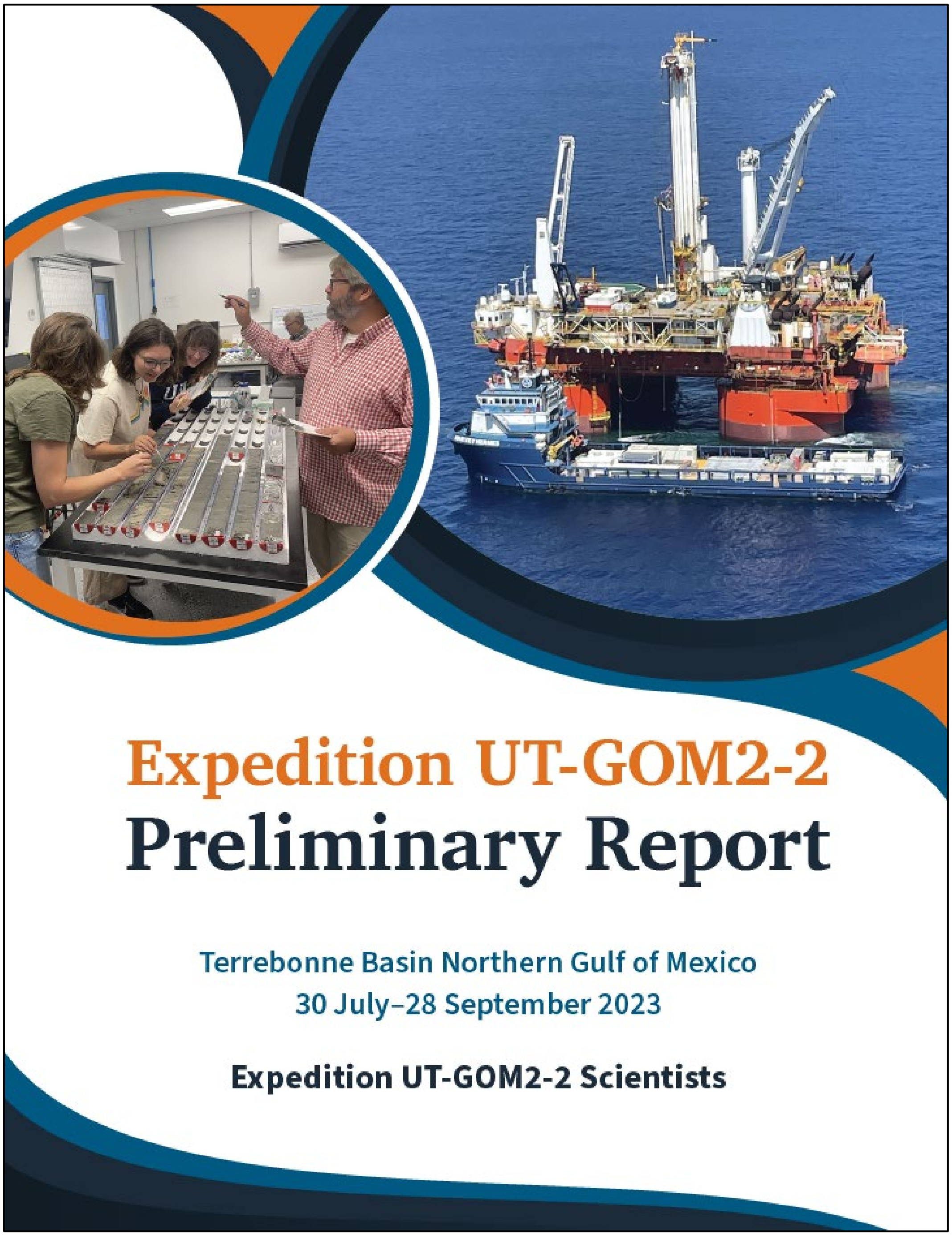


Figure 1-3. Cover page for the UT-GOM2-2 Expedition Preliminary Report.

UT-GOM2-2 Proceedings Volume

- UT and the project science team continued work on the UT-GOM2-2 Proceedings Volume. This volume will include three chapters: 1 – Summary, 2 – Methods, and 3 – WR313 Site H.
- The Proceedings Volume will be published on Zenodo.org, OSTI.gov, and our expedition website, UT-GOM2-2: Gulf of Mexico Deepwater Hydrate Coring Expedition - UT Institute for Geophysics. The estimated completion date is Feb 2025.

UT-GOM2-2 Data Archive / Data Directory

- UT continued to review core reports, coring data, curation data, logs and images to confirm the final integrated recovery data for each core.
- UT conducted an analysis of several options for the UT-GOM2-2 data archive including OTSI, Zenodo, and the UT Library. Zenodo was selected because of its additional capabilities and to match IODP. A Zenodo "community" or archive was created for GOM, Gulf of Mexico Deepwater Hydrate Coring.

UT-GOM2-2 Science Workshop

- UT continued to plan and organize the UT-GOM2-2 science workshop that will be held at Tapatio Springs in Boerne, TX from Oct. 27-30. The UT-GOM2-2 science workshop will include presentations and poster sessions on new science from UT-GOM2-2, brainstorming sessions for collaborative research and papers, and discussions of big science questions related to basin and reservoir insights.
- Participants will include science team members and/or project stakeholders from The University of Texas at Austin, The Ohio State University, University of New Hampshire, Oregon State University, University of Washington, Tufts University, New Mexico State, US DOE, and USGS.

1.2.2.5.3 *Subtask 18.3 – Scientific Results Volume and Technical Project Presentations*

American Geophysical Union Fall Meeting

- The project team and project participants continue planning to convene and participate in the dedicated hydrates session that will be held at the AGU fall meeting in Washington DC, AGU24, on December 13 (*Natural Gas Hydrate Systems Occurrence and Dynamic Behavior)*. This session includes a full morning and afternoon of posters, followed by the oral session at 4:00-5:30 PM EST
- The session will include abstracts from multiple institutions around the world. A total of 37 abstracts were submitted for review, 17 of which include GOM2-2 data and are authored by UT-GOM2-2 scientists.

UT-GOM2-2 Scientific Results Volume

- We have decided to submit a proposal to AGU for an AGU special collection, primarily in AGU's journal Geochemistry, Geophysics, Geosystems, on the UT-GOM2-2 hydrate coring expedition. This collection will be similar to the two special AAPG journal volumes on UT-GOM2-1 but broader in scope covering more topics related to hydrate system perturbation including hydrate formation and carbon cycling
- UT solicited and confirmed a group of co-organizers for the AGU special collection which will be led by Peter B. Flemings and includes scientists Alejandro Cardona, The University of Texas at Austin; Timothy S. Collett, United States Geological Survey; Stephen C. Phillips, United States Geological Survey; Ann E. Cook, The Ohio State University; Frederick S. Colwell, Oregon State University; Carla Thomas, The University of Texas at Austin; and Derek E. Sawyer, The Ohio State University.
- We will hold a dedicated session during the UT-GOM2-2 science meeting in October to identify collaborative "big picture" and baseline science papers for the G3 journal application.

1.3 What Will Be Done In The Next Reporting Period To Accomplish These Goals

1.3.1 Task 1.0 – Project Management & Planning

- UT will continue to execute the project in accordance with the approved Project Management Plan (PMP) and Statement of Project Objectives (SOPO).
- UT will continue to manage and control project activities in accordance with their established processes and procedures to ensure subtasks and tasks are completed within schedule and budget constraints defined by the PMP.

1.3.2 Task 13.0 – Maintenance And Refinement Of Pressure Core Transport, Storage, & Manipulation Capability

- We will confirm that mini-PCATS X-ray imaging is able to provide scans with enough accuracy to allow for adequate measurements, and determine the accuracy of diameters measured with this approach.
- UT will conduct geomechanical tests on pressure cores from UT-GOM2-1 to validate our improved experimental approaches. Particularly, we will conduct a production test where we will verify that our measured temperature, produced gas, and geomechanical and petrophysical properties are correctly determined. UT will plan and/or initiate testing of pressure cores from the GOM2-2 expedition. We will assess compressibility, in-situ stress and permeability behavior.
- The Mini-PCATS, PMRS, analytical equipment, and storage chambers will undergo continued observation and maintenance at regularly scheduled intervals and on an as-needed basis. Installation of new or replacement parts will continue to ensure operational readiness.
- UT will continue to test the Effective Stress Chamber computer system upgrade to ensure operational stability.
- UT will continue to evaluate and refine the temperature measurement capabilities of the Effective Stress Chamber test section.

1.3.3 Task 16.0 – UT-GOM2-2 Scientific Drilling Program Field Operations

- Task complete.

1.3.4 Task 17.0 – UT-GOM2-2 Core Analysis

1.3.4.1.1 *Pressure Coring Tool Assessment*

UT will continue working on the assessment of the PCTB. Results will be presented at the science workshop, in the proceedings volume, and at AGU24 in the poster titled: Pressure Coring in the Terrebonne Basin, Gulf of Mexico.

1.3.4.1.2 *Lithostratigraphy*

- UNH will present at AGU the poster titled: Investigating Late Pleistocene to Recent Bimodal Sedimentation in the Terrebonne Basin, Gulf of Mexico.
- UNH will present at AGU24 the poster titled: Stratigraphy, sediment composition, and provenance of Pleistocene strata of the Terrebonne Basin, northern Gulf of Mexico.

1.3.4.1.3 *Biostratigraphy*

- UT will continue to assess calcareous nannofossils as markers for the age of UT-GOM2-2 sediments and sediment deposition rates. Results will be discussed at our science workshop and will be presented at AGU24 in the poster titled: High-resolution Calcareous Nannofossil Biostratigraphy in the Terrebonne Basin, northern Gulf of Mexico. Deposition rates can impact methanogenesis.
- USGS will come again to UT to collect more ISO samples from intervals where not enough foraminifera were found.

1.3.4.1.4 *Physical Properties*

1.3.4.1.4.1 Thermal Conductivity, In-Situ Temperature, and Thermal Gradient

- UT will begin experiments to measure the thermal conductivity of reconstituted sediments.
- Predictions of the thermal gradient will be presented at AGU24 in the poster: Heat Flow in the Terrebonne Basin, Gulf of Mexico: Establishing the Gas Hydrate Stability Zone.

1.3.4.1.4.2 Core Logging and Imaging

- Work will begin on archiving images on Zenodo.

1.3.4.1.4.3 Strength and Compression Behavior

- Ohio State will present at AGU24 in the poster titled: Sediment Shear Strength Properties within the Hydrate Stability Zone: Results from the Gulf of Mexico Deepwater Hydrate Coring Expedition, Terrebonne Basin, Gulf of Mexico.
- Tufts University will continue work on Constant Rate of Strain consolidation tests. Initial results will be presented at AGU24 in the poster titled: Characterization of the compressive behavior of sediment in the Terrebonne Basin, Gulf of Mexico.
- Tufts will continue triaxial work on resedimented samples from whole round blended material.

1.3.4.1.4.4 Index Properties

- Tufts will continue measuring grain density with a gas pycnometer.
- Tufts distribute results from James Hutton for X-ray powdered diffraction to identify minerals and clays.

1.3.4.1.4.5 Rock Magnetism

- USGS will being working on a paper summarizing the magnetics of WR313.

1.3.4.1.5 *Dissolved Methane Concentration and Hydrate Saturation*

- USGS will present an AGU talk: Accumulation of microbial methane in hemipelagic sediments of the Terrebonne Basin, northern Gulf of Mexico.
- Ohio State will present at AGU24 the poster: Insights from X-ray computed Tomography on Core from the Terrebonne Basin, Gulf of Mexico

1.3.4.1.6 *Microbiology*

- Initial DNA results will be presented at AGU24 in the poster titled: Microbial Distribution in Methane Hydrate-Containing Deep Sea Sediments in the Terrebonne Basin, Gulf of Mexico.
- Oregon State will continue to work with other microbiologists who received samples from 2023 expedition at Walker Ridge 313 Site H.

1.3.4.1.7 *Geochemistry*

- UW will correct all pore water concentrations for contamination.
- UW will present a poster at AGU24 on pore water geochemistry titled: Geochemical Constraints on the Genesis of Methane Hydrates in the Terrebonne Basin, Gulf of Mexico
- UW will continue the analysis of the samples collected during GOM2-2 for minor element concentrations and continue sediment leaching experiments to characterize the sediment trace metal concentrations (Fe, Mn, Ni, Co, Cr, Cu) and associated solid phases with depth in Hole H003.
- New Mexico will present at AGU24 the poster titled: Using Noble Gas Tracers to Constrain the Residence Time of Methane Gas Hydrates in the Gulf of Mexico.
- UNH will run Total Organic Carbon, Calcium Carbonate (CaCO3), Total Nitrogen, Total Sulfur, delta 13C isotope, and delta 34S isotope measurements on as many of the ~450 UT-GOM2-2 sediment samples as they can.
- UNH will present Initial results from previously analyzed samples (sediment from pore water squeezing) at AGU24 in the poster titled: Sediment Geochemistry and Early Diagenesis in the Terrebonne Basin, Gulf of Mexico.

1.3.5 Task 18.0 – Project Data Analysis and Reporting

- The project science team will continue working on edits to the Expedition Proceedings to be published in Feb 2025.
- The project science team will begin archiving datasets on Zenodo.

2 PRODUCTS

Project publications webpage:

https://ig.utexas.edu/energy/gom2-methane-hydrates-at-the-university-of-texas/gom2-publications/

2.1 Publications

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Darnell, K. N., Flemings, P. B., and DiCarlo, D., 2019, Nitrogen-Driven Chromatographic Separation During Gas Injection Into Hydrate-Bearing Sediments: Water Resources Research. https://doi.org/10.1029/2018wr023414

Ewton, E., 2019, The effects of X-ray CT scanning on microbial communities in sediment cores, Oregon State University.

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2.3 Proceeding of the UT-GOM2-1 Hydrate Pressure Coring Expedition

Volume contents are published on the UT-GOM2-1 Expedition website and on OSTI.gov.

2.3.1 Volume Reference

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2.3.2 Prospectus

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2.4 Proceeding of the UT-GOM2-2 Hydrate Coring Expedition

Volume contents will be published on the UT-GOM2-2 Expedition Proceedings website and on OSTI.gov.

2.4.1 Prospectus

Peter Flemings, Carla Thomas, Tim Collett, Fredrick Colwell, Ann Cook, John Germaine, Melanie Holland, Jesse Houghton, Joel Johnson, Alberto Malinverno, Kevin Meazell, Tom Pettigrew, Steve Phillips, Alexey Portnov, Aaron Price, Manasij Santra, Peter Schultheiss, Evan Solomon, Kehua You, UT-GOM2-2 Prospectus: Science and Sample Distribution Plan, Austin, TX (University of Texas Institute for Geophysics, TX). http://dx.doi.org/10.2172/1827729, 141 p.

2.4.2 Preliminary Report

Peter B. Flemings, Carla Thomas, Stephen C. Phillips, Timothy S. Collett, Ann E. Cook, Evan Solomon, Frederick S. Colwell, Joel E. Johnson, David Awwiller, Irita Aylward, Athma R. Bhandari, Donald Brooks, Alejandro Cardona, Michael Casso, Rachel Coyte, Tom Darrah, Marcy Davis, Brandon Dugan, Dan Duncan, John T. Germaine, Melanie Holland, Jesse Houghton, N. Tanner Mills, Michael Mimitz, Daniel Minarich, Yuki Morono, Zachary Murphy, Joshua O'Connell, Ethan Petrou, Tom Pettigrew, John W. Pohlman, Alexey Portnov, Marcie Purkey Phillips, Thomas Redd, Derek E. Sawyer, Peter Schultheiss, Kelly Shannon, Camille Sullivan, Cathal Small, Kayla Tozier, Man-Yin Tsang, Camila Van Der Maal, William F. Waite, Taylor Walton, 2024, UT-GOM2-2 Preliminary Report Terrebonne Basin Northern Gulf of Mexico, The University of Texas Institute for Geophysics, https://doi.org/10.5281/zenodo.13648253

2.5 Websites

- Project Website:

https://ig.utexas.edu/energy/genesis-of-methane-hydrate-in-coarse-grained-systems/

- UT-GOM2-2 Expedition Website

https://ig.utexas.edu/energy/gom2-methane-hydrates-at-the-university-of-texas/gom2-2-expedition/

- UT-GOM2-1 Expedition Website:

https://ig.utexas.edu/energy/genesis-of-methane-hydrate-in-coarse-grained-systems/expedition-ut-gom2-1/

- Project SharePoint:

https://sps.austin.utexas.edu/sites/GEOMech/doehd/teams/

- Methane Hydrate: Fire, Ice, and Huge Quantities of Potential Energy:

https://www.youtube.com/watch?v=f1G302BBX9w

- Fueling the Future: The Search for Methane Hydrate:

https://www.youtube.com/watch?v=z1dFc-fdah4

- Pressure Coring Tool Development Video:

https://www.youtube.com/watch?v=DXseEbKp5Ak&t=154s

2.6 Technologies Or Techniques

Nothing to report.

2.7 Inventions, Patent Applications, and/or Licenses

Nothing to report.

3 CHANGES/PROBLEMS

3.1 Changes In Approach And Reasons For Change

None.

3.2 Actual Or Anticipated Problems Or Delays And Actions Or Plans To Resolve Them

None.

3.3 Changes That Have A Significant Impact On Expenditures

None.

3.4 Change Of Primary Performance Site Location From That Originally Proposed

None.

4 SPECIAL REPORTING REQUIREMENTS

4.1 Current Project Period

Task 1.0 – Revised Project Management Plan

Subtask 18.1 – Project Sample and Data Distribution Plan

Subtask 18.3 – UT-GOM2-2 Scientific Drilling Program Scientific Results Volume

4.2 Future Project Periods

None.

5 BUDGETARY INFORMATION

The Budget Period 6 cost summary is provided in Table 5-1.

Table 5-1. Phase 6 / Budget Period 6 Cost Profile

Baseline Reporting Quarter	Budget Period 6							
	Y1Q1		Y1Q2		Y1Q3		Y1Q4	
	11/16/23-12/31/23		01/01/24-03/31/24		04/01/24-06/30/24		07/01/24-09/30/24	
	Y1Q1	Cumulative Total	Y1Q2	Cumulative Total	Y1Q3	Cumulative Total	Y1Q4	Cumulative Total
Baseline Cost Plan								
Federal Share	$ 555,325	$ 71,091,055	$ 471,086	$ 71,562,141	$ 456,085	$ 72,018,226	$ 456,085	$ 72,474,312
Non-Federal Share	$ 282,554	$ 32,363,632	$ 271,503	$ 32,635,135	$ 269,534	$ 32,904,669	$ 269,535	$ 33,174,204
Total Planned	$ 837,880	$ 103,454,687	$ 742,590	$ 104,197,276	$ 725,619	$ 104,922,895	$ 725,620	$ 105,648,516
Actual Incurred Cost								
Federal Share	$ 2,871,720	$ 70,588,076	$ 391,191	$ 70,979,267	$ 407,450	$ 71,386,716	$ 370,446	$ 71,757,162
Non-Federal Share	$ 745,317	$ 34,398,513	$ 152,951	$ 34,551,464	$ 160,980	$ 34,712,444	$ 130,874	$ 34,843,318
Total Incurred Cost	$ 3,617,037	$ 104,986,589	$ 544,142	$ 105,530,731	$ 568,429	$ 106,099,160	$ 501,320	$ 106,600,480
Variance								
Federal Share	$ 2,316,395	$ (502,979)	$ (79,895)	$ (582,875)	$ (48,636)	$ (631,510)	$ (85,639)	$ (717,150)
Non-Federal Share	$ 462,762	$ 2,034,882	$ (118,552)	$ 1,916,330	$ (108,554)	$ 1,807,775	$ (138,662)	$ 1,669,114
Total Variance	$ 2,779,157	$ 1,531,902	$ (198,448)	$ 1,333,455	$ (157,190)	$ 1,176,265	$ (224,301)	$ 951,964
Baseline Reporting Quarter	**Budget Period 6**							
	Y2Q1		Y2Q2		Y2Q3		Y2Q4	
	10/01/24-12/31/24		01/01/25-03/31/25		04/01/25-06/30/25		07/01/25-09/30/25	
	Y2Q1	Cumulative Total	Y2Q2	Cumulative Total	Y2Q3	Cumulative Total	Y2Q4	Cumulative Total
Baseline Cost Plan								
Federal Share	$ 401,106	$ 72,875,417	$ 401,106	$ 73,276,523	$ 385,250	$ 73,661,774	$ 385,250	$ 74,047,024
Non-Federal Share	$ 218,494	$ 33,392,698	$ 218,494	$ 33,611,191	$ 216,156	$ 33,827,347	$ 216,156	$ 34,043,503
Total Planned	$ 619,599	$ 106,268,115	$ 619,599	$ 106,887,715	$ 601,406	$ 107,489,121	$ 601,406	$ 108,090,527
Actual Incurred Cost								
Federal Share		$ 71,757,162		$ 71,757,162		$ 71,757,162		$ 71,757,162
Non-Federal Share		$ 34,843,318		$ 34,843,318		$ 34,843,318		$ 34,843,318
Total Incurred Cost	$ -	$ 106,600,480	$ -	$ 106,600,480	$ -	$ 106,600,480	$ -	$ 106,600,480
Variance								
Federal Share								
Non-Federal Share								
Total Variance								

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7 ACRONYMS

Table 7-1. List of Acronyms

ACRONYM	DEFINITION
AAPG	American Association of Petroleum Geologists
AGU	American Geophysical Union
AOM	Anaerobic Oxidation of Methane
BOEM	Bureau of Ocean Energy Management
BSR	Bottom-Simulating Reflector
BSEE	Bureau of Safety and Environmental Enforcement
CPP	Complimentary Project Proposal
CT	Computed Tomography
DNA	Deoxyribonucleic Acid
DOE	U.S. Department of Energy
GC	Green Canyon
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
IODP	International Ocean Discovery Program
LWD	Logging While Drilling
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NMT	New Mexico Tech
OSR	Organoclastic Sulfate Reduction
OSTI	Office of Scientific and Technical Information
OSU	The Ohio State University
PCATS	Pressure Core Analysis and Transfer System
PCC	Pressure Core Center
PCTB	Pressure Core Tool with Ball Valve
PI	Principle Investigator
PM	Project Manager
PMP	Project Management Plan
PMRS	Pressure Maintenance and Relief System
QRPPR	Quarterly Research Performance and Progress Report
RPPR	Research Performance and Progress Report
SEM	Scanning Electron Microscope
SOPO	Statement of Project Objectives
UNH	University of New Hampshire
USGS	United States Geological Survey
UT	University of Texas at Austin
UW	University of Washington
WR	Walker Ridge
XCT	X-ray Computed Tomography

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