NATIONAL ENERGY TECHNOLOGY LABORATORY

DOE Award No.: DE-FE0023919

Quarterly Research Performance Progress Report

(Period Ending 12/31/23)

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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Office of Fossil Energy

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DISCLAIMER

1 ACCOMPLISHMENTS

This report outlines the progress of the first quarter of the tenth fiscal year of the project (Oct. 1 – Dec. 31, 2023). This performance period occurred within the no-cost extension of Budget Period 5, Year 4, from Oct. 1 through Nov. 14, and Budget Period 6, Year 1, from Nov. 15 through Dec. 31. Highlights from this period include:

- Geotek completed curation of UT-GOM2-2 conventional cores at the "Dockside" field station at Geotek Coring, Salt Lake City, Utah. All UT-GOM2-2 conventional cores, small whole rounds, and bagged samples were transported to UT Austin on Dec. 13, 2023. The cores are now stored at the UT Austin Department of Earth and Planetary Sciences refrigerated core and sample storage facility.

- The UT-GOM2-2 Science Team nearly completed all the formal reporting for the Preliminary Report document that is being currently prepared.

- GOM2 scientists presented two talks and five posters at the American Geophysical Union (AGU) Fall Meeting (Dec. 11-15, 2023), in San Francisco, CA.

- GOM2 project scientists Ann Cook (OSU), Alejandro Cardona (UT Austin), and Stephen Phillips (USGS) co-chaired the hydrates session at the AGU Fall Meeting (Dec. 11-15, 2023), in San Francisco, CA.

- UT Austin's proposal to transition from Budget Period 5 to Budget Period 6 was approved by US DOE. Budget Period 6 formally commenced on Nov. 15, 2023.

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	-	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 (Phase 1, 2, 3, 4, 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

Status: Ongoing

- **Coordinate the overall scientific progress, administration and finances of the project:**
  - UT monitored and controlled the project budget, scope, and schedule.
  - UT submitted a formal request to transition from Budget Period 5 (BP5) to Budget Period 6 (BP6). On Nov. 1, 2023, UT and DOE-NETL convened a web conference during which UT presented the overall project status, BP5 accomplishments, and the project plan for BP6.
  - US DOE approved the BP6 transition proposal and the project transitioned from BP5 to BP6 on Nov. 15, 2023.

- **Communicate with project team and sponsors:**
  - 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.

- **Coordinate and supervise service agreements:**
  - UT closed-out contracts and completed final invoice negotiations with service providers for UT-GOM2-2 field operations, including Helix, third-party alliance subcontractors, and Geotek.
  - UT completed an audit request from ANCO Insurance. This audit was required by TransPac to assess actual duration and frequency of downhole tool use and drill pipe length utilized during the UT-GOM2-2 field activities. UT completed the audit, and the downhole equipment premium was adjusted accordingly.
  - UT monitored and validated subcontractor workplans and deliverables.

- **Coordinate subcontractors:**
  - Amendments to fund subcontractors for BP6 were submitted to the UT Office of Sponsored Projects.
  - UT continued to monitor and control subaward and contractor efforts.

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

Status: Ongoing

1.2.2.2.1 *Long-Term Pressure Core Storage Optimization*

UT continues to evaluate measures to mitigate methane hydrate dissolution by saturating pressure core storage chamber water with dissolved methane. UT has assembled the components required to create methane-saturated water in a pressurized vessel and is pressure testing the system to quantify and stop system leaks. In this quarter, UT continued long-term pressure testing of the methane saturation vessel to ensure viable leak protection and prevent system/core pressure loss.

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

The mini-PCATS system underwent a full pressure test and additional minor leak mitigation efforts to ensure long-term stability of the system. The X-ray system underwent quarterly calibration.

1.2.2.2.3 *Subtask 13.2 – Hydrate Core Effective Stress Chamber*

Geotek made their annual Pressure Core Center Service Visit. A new computer was installed and configured to run the Hydrate Core Effective Stress Chamber software. The new computer has a more capable hardware processor and includes new software. All equipment and software were successfully tested during Geotek’s visit.

In this quarter, we focused on improving our capability to perform uniaxial strain deformation tests, where the samples deform exclusively along the axial direction. We carried out four calibration tests under high fluid pressure using well-known resedimented clay samples. The results revealed that, under high pressure, the samples experience radial reduction, leading to errors in the measured properties. This effect is specific to high fluid pressure conditions. We have identified two potential causes for this behavior: (1) minor leaks from the pore chamber to the external environment and (2) the compressibility of the equipment, where our initial assessment underestimated the true value. UT will continue to investigate these findings in order to propose potential solutions.

The Effective Stress Chamber underwent complete tear down and general maintenance. UT replaced all hydraulic seals and lubricated all moving parts.

1.2.2.2.4 *Subtask 13.3 – Hydrate Core Depressurization Chamber*

After conducting the quantitative degassing of core remnants in the previous quarter, the manifold plumbing of the system was fully disassembled for sediment removal and cleaning. The system valves underwent additional maintenance to ensure proper sealing of the valve seats. The computer system used to track system pressures during depressurization underwent software and firmware updates.

1.2.2.2.5 *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.

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

The X-Ray CT continues to operate as designed. The Dell Image Reconstruction computer underwent a repair in the previous quarter due to a firmware update error. The computer is now functional.

1.2.2.2.7 *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.

1.2.2.2.8 *Subtask 13.9 – Transportation of Hydrate Core from UT-GOM2-2 Scientific Drilling Program*

Geotek delivered UT-GOM2-2 conventional and depressurized cores to UT on December 13, 2023. The cores were transferred to storage racks in the Department of Earth and Planetary Sciences refrigerated core and sample storage facility on the UT Austin main campus (Figure 1-1). This delivery occurred after the conventional and depressurized cores were transported to Geotek Coring's facility in College Station, TX for logging and CT scanning and then shipped to Geotek Coring Inc. in Salt Lake City, Utah for the UT-GOM2-2 "Dockside" core analysis program.

Figure 1-1. UT-GOM2-2 conventional cores stored in the refrigerated core and sample storage facility of the Department of Earth and Planetary Sciences at the UT Jackson School of Geosciences.

1.2.2.2.9 *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.

1.2.2.2.10 *Subtask 13.11 – Hydrate Core Distribution*

Future Task

1.2.2.3 Task 14.0 – Performance Assessment, Modifications, and Testing of PCTB

Status: Task formally completed in BP5. Additional updates beyond task obligations are reported below.

1.2.2.3.1 *Pressure Coring Tool Performance*

UT continued working on the analysis of the performance of the pressure coring tool assessing ball valve, seal depth and boost performance. Figure 1-2 and Figure 1-3 provide an example of the draft analysis for Core H003-29CS where the borehole, autoclave, and core pressure and temperature data were successfully recorded. The autoclave sealed when the autoclave pressure was boosted from ~3300 to ~3700 psi when the core barrel was released from the bottom-hole assembly after several attempts with over 10,000 lbs of pull at 5:48 AM. The core temperature remained low even while pulling through the thermocline and the core never left the hydrate stability boundary. H003-29CS was recovered and the pressure was measured on the rig floor at 3480 psi.

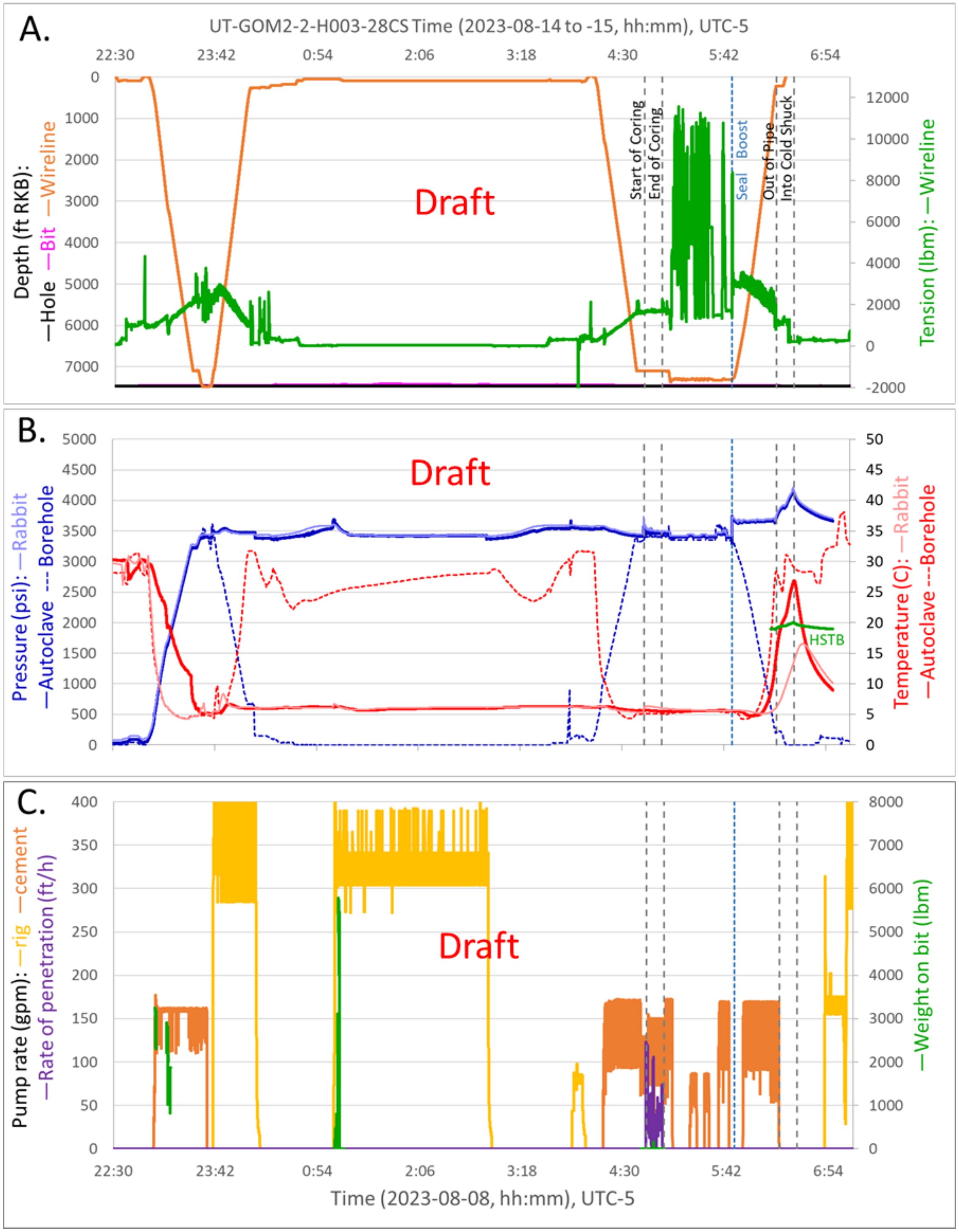

Figure 1-2. UT-GOM2-2-H003-29CS draft coring data including seafloor delay to cool core. A) Wireline tension shown as a solid green line, wireline depth shown as a solid orange line, bit depth shown as a magenta line, and hole depth shown as a solid black line. B) Autoclave pressure shown as a solid blue line, core pressure as a solid light blue line, borehole pressure shown as a dashed blue line, autoclave temperature shown as a solid red line, core temperature as a solid pink line, and borehole temperature shown as dashed red line. Measured values for the autoclave, core, and the borehole are from the PCTB IT-plug, rabbit DST plug, and sinker bar Data Storage Tag (DST), respectively. The inner tube plug DST is in contact with the autoclave and the rabbit DST is in contact with the core. Thus, the autoclave temperature range (solid

red line) is greater than the core temperature (solid pink line) range because of the lower thermal conductivity of the core. The hydrate stability temperature boundary (HSTB) is shown as a solid green line and is the upper limit of the temperature calculated from the autoclave pressure assuming seawater salinity (3.5% NaCl). Any hydrate present in the core will be stable if the core temperature (solid pink line) stays below and to the left of the boundary (solid green line). Core H003-29CS never left the hydrate stability zone. The fluids surrounding the IT-plug DST and Rabbit DST are in contact, thus the autoclave pressure and core pressure should always be the same assuming the DSTs are properly tared. Core H003-29CS likely partially seals at unlatching and the pressure slowly bleeds off until the pressure boost is triggered. C) Hex pump rate is shown as a solid yellow line. Cement (CMT) pump rate is shown as a solid orange line. Rates are the total flow in from all pumps on each system. The weight on bit is shown as a solid green line and is calculated from hook load (WOB). A discussion of the various measurements of WOB will be discussed in the expedition report methods. The instantaneous rate of penetration (ROP) is shown as a solid purple line. Vertical dashed lines that cut through A, B, and C show specific points in the pressure coring deployment. Controlled points including the start of coring, end of coring, initial pull to unlatch, removing the core barrel from the pipe and placing the lower section of the core barrel into the cold shuck are shown as dark grey dashed lines. Resulting points of autoclave sealing and pressure boost are shown as dashed aqua blue lines or a single dashed aqua blue line if concurrent.

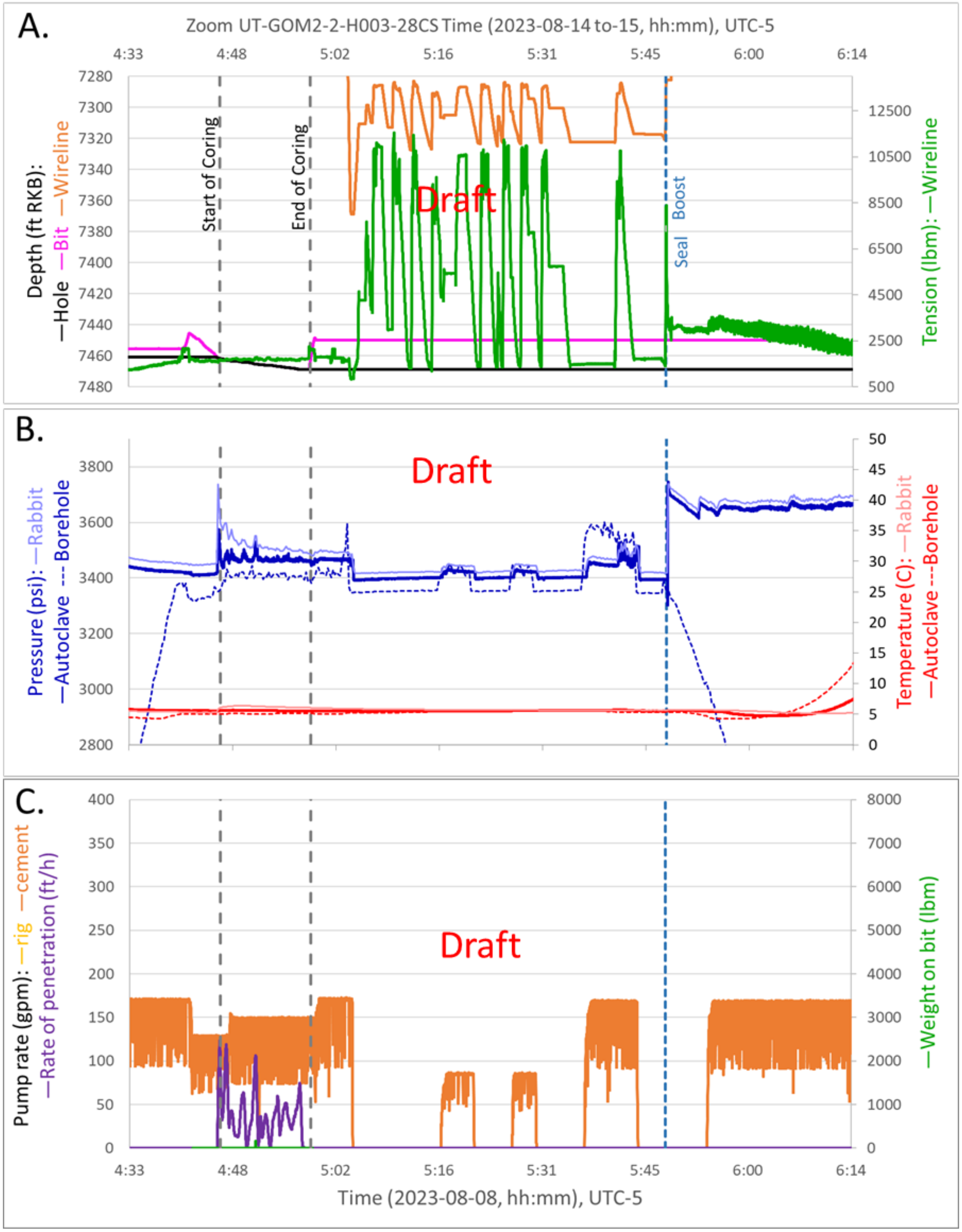

Figure 1-3. Expanded view of draft UT-GOM2-2-H003-29CS coring data

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

1.2.2.4.1 *Subtask 16.6 – Post-Expedition Permitting*

- **BSEE Well Record Submittals**

UT requested an extension from BSEE for the following well record requirements for wells WR313 H002 (608124014800) and WR313 H003 (608124014900), pursuant to 30 CFR 250.103 and BSEE NTL 2016-N07.

  - Core Reports
  - Paleontological Reports
  - Geochemical Analysis Reports

BSEE granted an extension through 9/30/2024, but requested that the reports be submitted as soon as possible. UT Austin is working with the project subaward universities and contractors to catalogue cores, conduct geochemical analysis, and conduct paleontological analysis (e.g., nannofossil biostratigraphy). The outstanding BSEE well records will be submitted once we have generated sufficient data and compiled the reports.

- **BOEM Right of Use and Easement**

UT received confirmation from BOEM Plans Section on 10/10/23 that the UT Austin Right-of-Use and Easement (RUE) No. OCS-G 30392 was terminated, in accordance with the terms of the RUE agreement.

- **BOEM Final Report**

UT completed and submitted a Final Report to BOEM, per the conditions of approval for G&G Permit no L22-025. The BOEM Final Report included a description of the work performed including number of samples acquired, coring drilling and sampling methods, a daily log of operations, location plats, environmental summary, location/survey data, and other information as required by the permit.

1.2.2.5 Task 17.0 – UT-GOM2-2 Core Analysis

1.2.2.5.1 *UT reviewed core reports, coring data, curation data, logs and images to confirm the final recovery data for each core. Lithostratigraphy*

UNH continued work on smear slide analysis and writing up lithostratigraphy methods and initial results.

- Sediments are predominantly variably colored clays with silt to fine sand laminations (mm scale) and a few beds (up to ~10 cm) interspersed throughout the holes, but more common in the deeper strata.
- Color variation in the clays appears to be largely driven by changes in the proportions of CaCO3 biogenic grains relative to the clay sized lithogenic particles.
- Three candidate unconformities were identified the cores. These surfaces have not yet been tied to the seismic data; they may either reflect local salt movement or may be more regional in nature.

UT and UNH worked on populating core layouts in Strater.

Figure 1-4. Core Section H003-14H-1 top at 80.8 mbsf with possible sequence boundary. Lighter colored area at 127 cm within the darker lithogenic clay (123.5 cm and lower) is indicative of a burrow dug by an organism and later filled with lighter-color overlaying biogenic-pelagic ooze (123.5 cm and higher). Right, photo of UNH PI Joel Johnson preparing a smear slide in Salt Lake City.

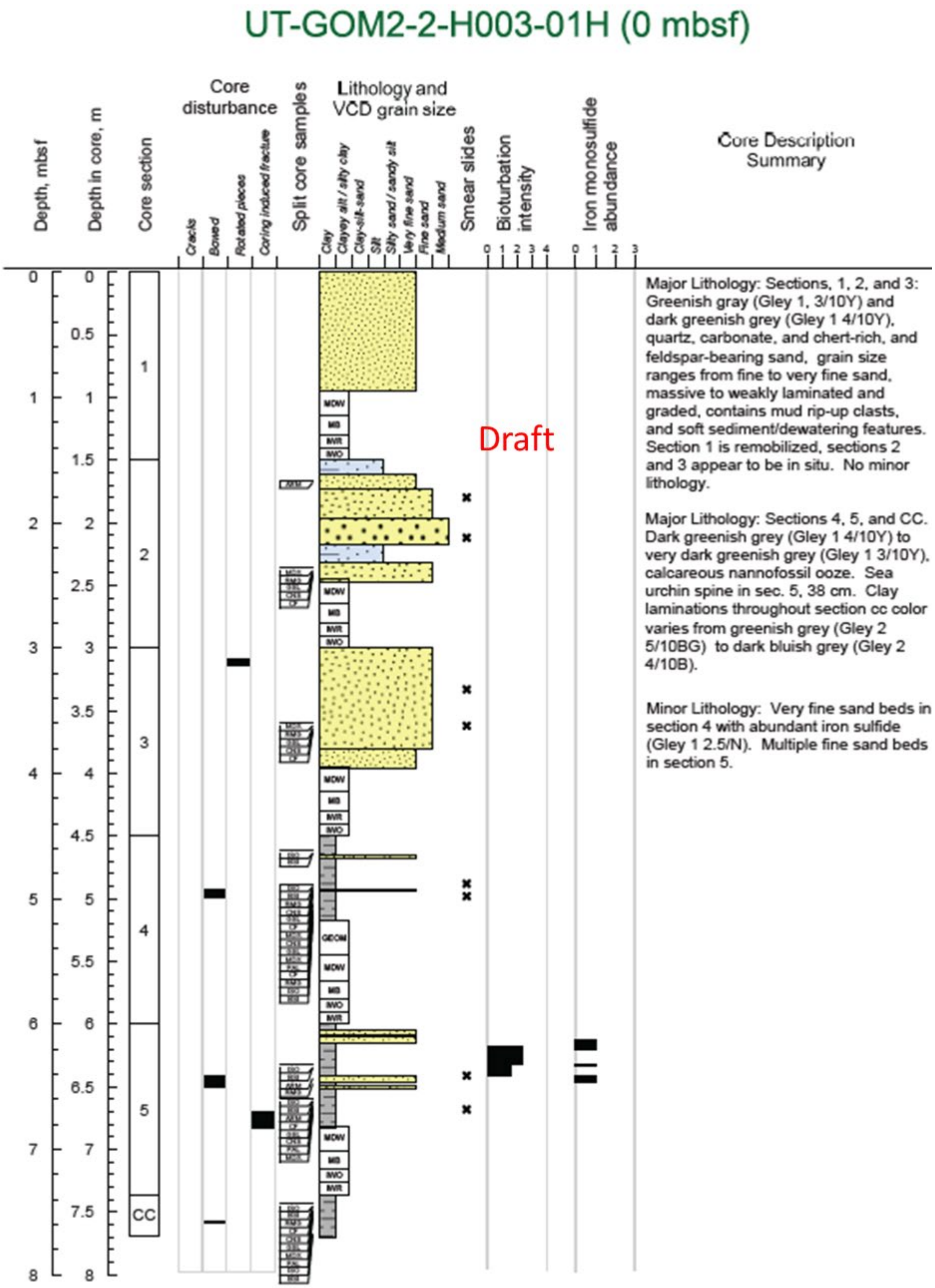

Figure 1-5. Example Draft Core Description from H003-01H. This illustrates the surprisingly sandy conditions encountered at the seafloor.

1.2.2.5.2 *Biostratigraphy*

An initial biostratigraphy-based age model was interpreted by UT (Purkey-Phillips), in collaboration with UNH (Johnson). The age model was constructed from the quantitative examination of calcareous nannofossils from 68 total samples collected from both core catchers and split cores through both holes H003 and H002. A total of 6 biostratigraphic horizons were identified; and the deepest sample collected for biostratigraphic analysis, at 859.15 mbsf, is interpreted to be <0.91 Ma.

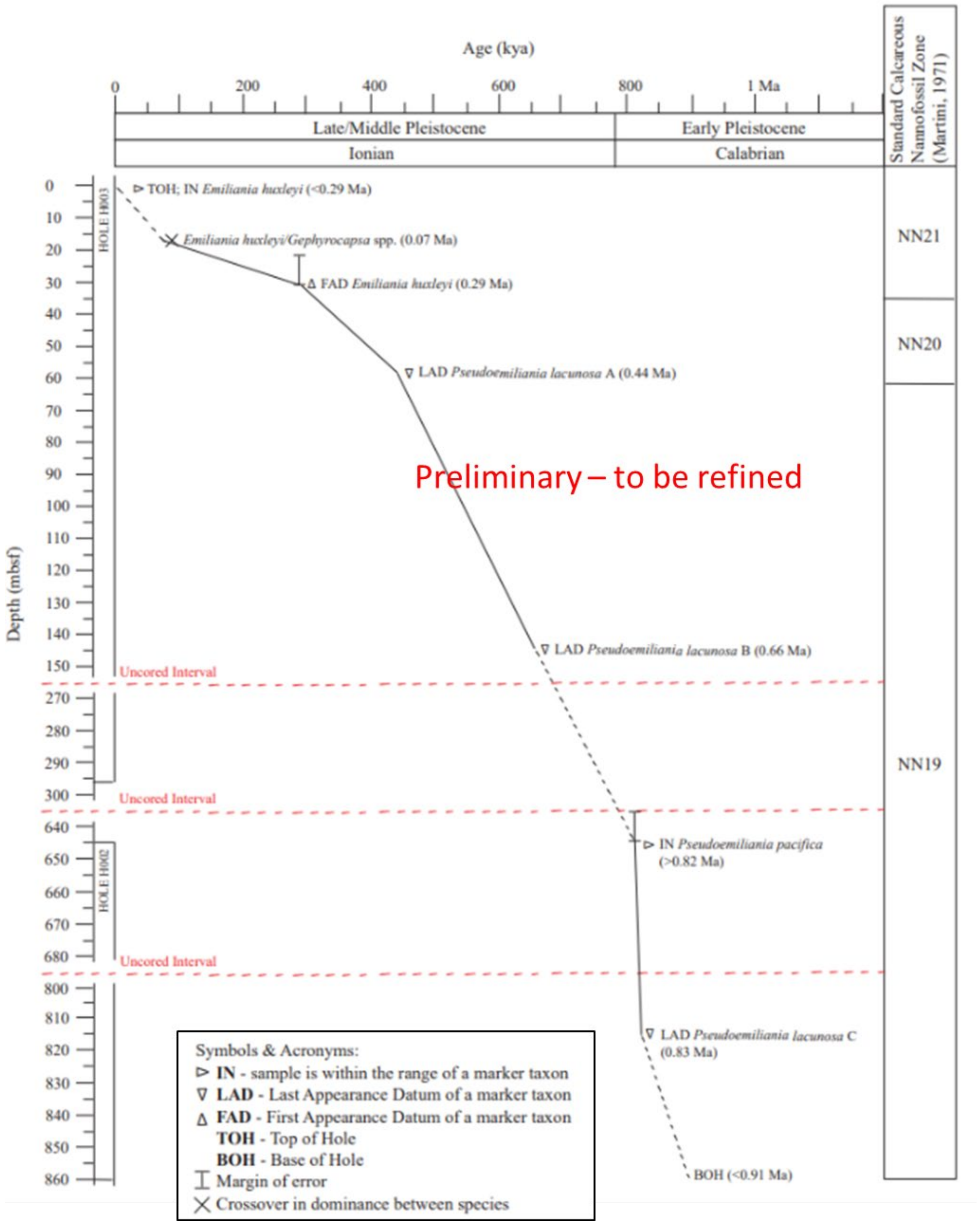

Figure 1-6. UT-GOM2-2 preliminary composite time-depth plot of holes H003 & H002 (2023-12-10) to be refined in 2024. Calcareous nannofossil events are from the Biostratigraphic Chart - Gulf Basin, USA , produced by Paleo Data Inc. (Waterman, 2017), a Petrostrat company. The geologic time scale is calibrated to that of Ogg et al. (2016).

1.2.2.5.3 *Physical Properties*

1.2.2.5.3.1 In-situ Temperature

The APCT-3 was deployed twelve times in hole UT-GOM2-2-H003, but only ten of those included a dwell time long enough to infer the in-situ temperature

Figure 1-7 shows the temperature evolution with time for every deployment. All deployments show the temperature rise associated with the G-APC shot. 01H and 02H were intended to assess the performance of the APCT-3 downhole, rather than to measure temperature. Thus, they do not include a dwell time and there is no evident thermal decay.

Temperature measurements from 27.1 mbsf (03H) to 144.5 mbsf (23H) all show a gradual thermal decay after the frictional heating caused by the G-APC insertion. We consider all these good temperature measurements; thus, we use all these deployments to infer the in-situ temperature. Deployments 03H, 06H, 12H, 14H, and 17H display a sharp second temperature peak associated to the retrieval of the tool. Conversely, deployments 07H, 09H, 10H, 21H and 23H depict a more erratic temperature increase after thermal decay. We attribute this behavior to the attempts to retrieve the tool using either the wireline or the top drive system.

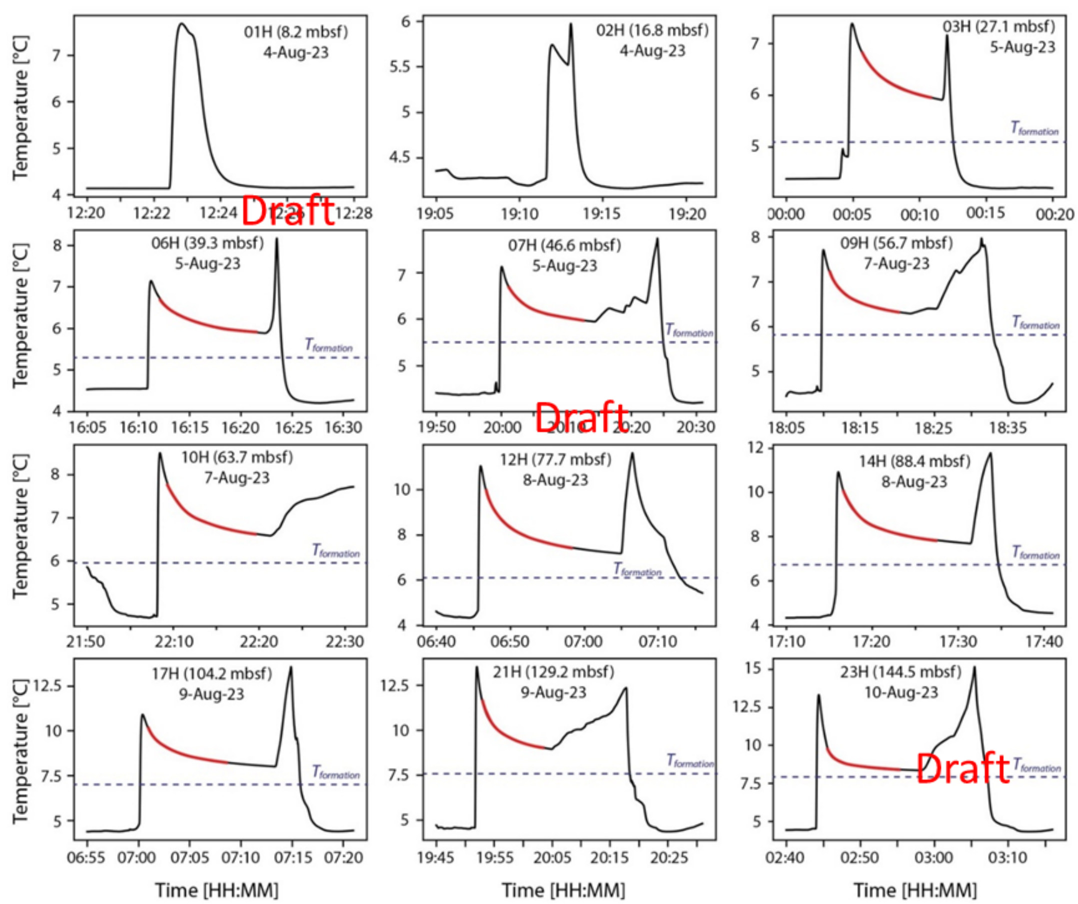

Figure 1-7. Draft Temperature record for each APCT deployment in H003.

1.2.2.5.3.2 Core Logs

Core logging images and data from PCATs and the Geotek MSCL-S and MSCL-CT were imported into Strater by UT. Ohio State is reviewing CT data from pressure cores to see if there is any evidence of hydrate-filled fractures.

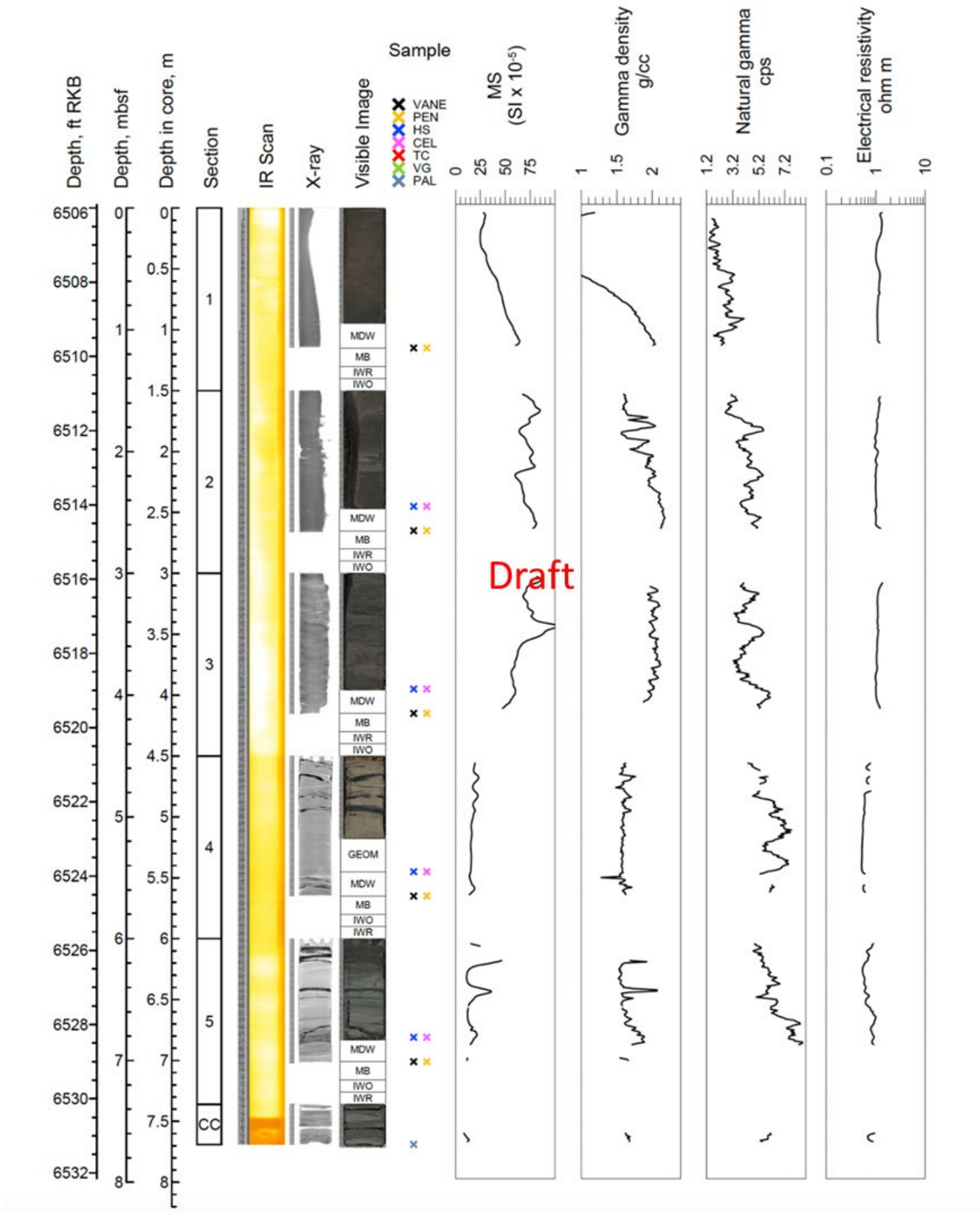

Figure 1-8. Example draft Strater core log and imaging data for conventional core, H003-01H

1.2.2.5.3.3 Index Properties

1.2.2.5.3.3.1 Laser Diffraction Particle Size Analysis

Grain size measurement were on subsamples (<1 g) of core obtained from WR313 H002 (34 subsamples) and WR313 H003 (35 subsamples) were initiated at UT using a Malvern Mastersizer 3000 particle size analyzer with a Hydro LV dispersion unit (600 mL volume).

1.2.2.5.3.3.2 Moisture and Density, Atterberg Limits

Physical property measurements are being made at Tufts. The results are still considered preliminary pending modification based on measured grain density and salinity in the pore fluid.

Figure 1-9 plots the H001 LWD measured porosity and H003 Porosity (S=100) with depth. While the general laboratory trend is consistent with the LWD data, there does appear to be an offset in the layer elevations between the holes and an increasing porosity offset with depth with the LWD values lower than the lab values. Better correlation methods are being developed to account for H003 deviation.

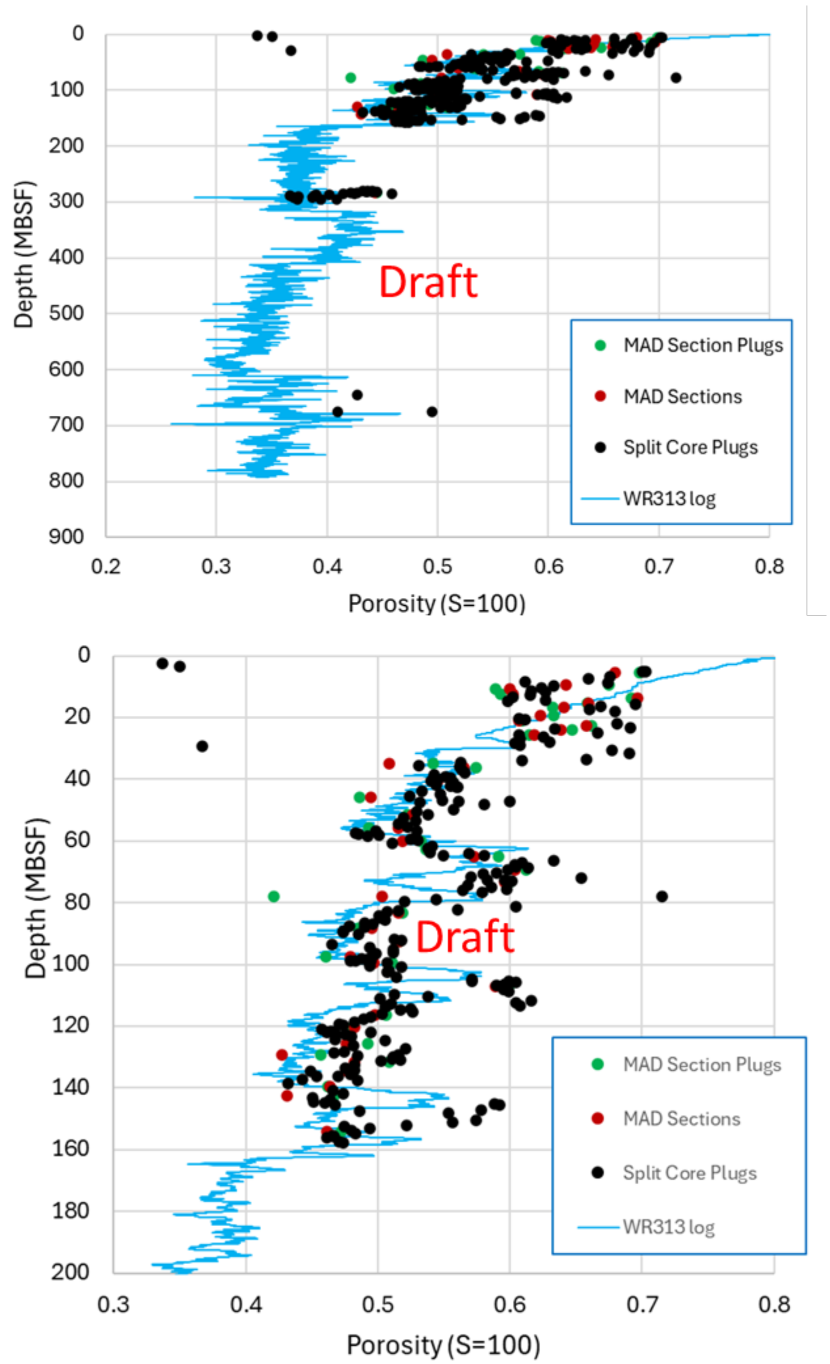

Figure 1-9. Draft Comparison of porosity profile from the laboratory measurements and the logging result from WR313. Logging data not offset for H003 deviation. Laboratory measurements are based on assuming S=100 %. Top: all data points, Bottom: just the upper 200 meters

1.2.2.5.3.4 Rock Magnetism

A total of 372 paleomagnetic cube sample were collected from either H003 split cores (270 samples) or from pore water squeeze cakes (102 samples). 31 of the split core samples were collected from observed anomalies (e.g., spikes, low values, or transitions) in the whole round magnetic susceptibility (χ) values. Analysis was also completed for H002. H003 results are discussed below.

Low frequency χ ranges from 1.96 x 10^{-8} to 1.43 x 10^{-6} m^3 kg^{-1} with a mean of 1.29 x 10^{-7} m^3 kg^{-1} (Fig. 3.7.X). High frequency χ ranges from 1.60 x 10^{-8} to 1.43 x 10^{-6} m^3 kg^{-1} with a mean of 1.24 x 10^{-7} m^3 kg^{-1} (Fig. X). Frequency dependence of χ (χ_{fd}) ranges from -7.3 % to 25.1 % with a mean of 5.2 %.

χ decreases over the upper 14 mbsf and remains low (<5 x 10^{-8} m^3) to 26 mbsf, then increasing to ~2 x 10^{-7} m^3 kg^{-1} between 33 and 64 mbsf. Additional low intervals occur between 65 and 75 mbsf and 108 and 156 mbsf. χ_{fd} is generally less than 5% in the relatively higher χ but increases with some samples in the 10-25% range in the lower χ intervals.

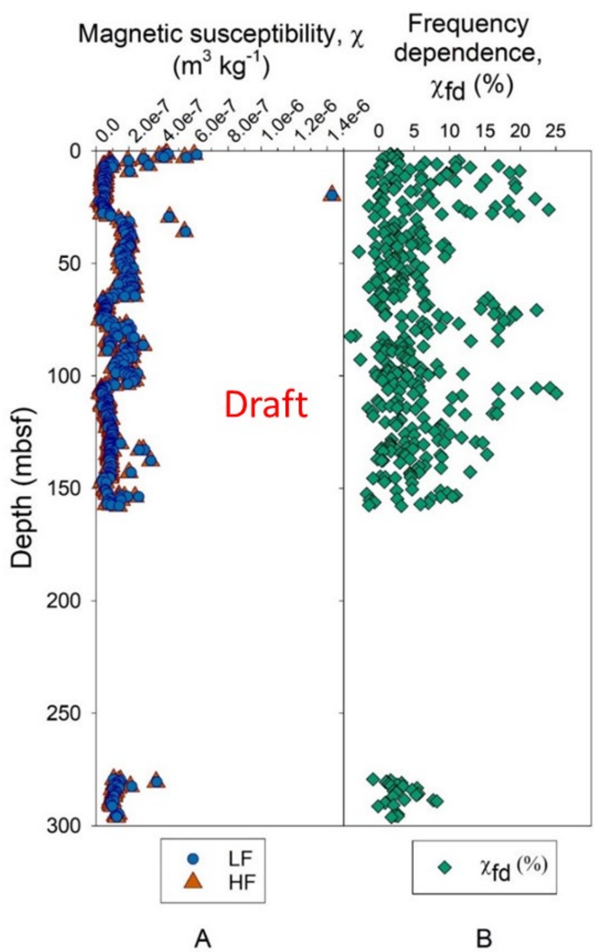

Figure 1-10. Initial H003 magnetic susceptibility results. A) Mass-normalized magnetic susceptibility (χ) at UT-GOM2-2-WR313-H003. Low frequency measurements (LF) shown as blue circles and high frequency (HF) measurements as red triangles. B) Frequency dependence of magnetic susceptibility (χ).

1.2.2.5.4 *Microbiology*

Oregon State initiated the study of low-biomass, clay-rich UT-GOM2-2 samples collected for microbiological community characterization. Because free-DNA binds to clay-rich sediments, low-biomass DNA extraction protocols have been developed, through this project, for deep marine sediments to improve recovery of low levels of extracted DNA. These adapted methods improve yields of DNA released from native microbes such that it can subsequently be sequenced. Clean-lab protocols have also been refined over the last few years to minimize the likelihood of lab contamination including the construction of an enclosure in our lab to be used for initial processing of samples. Details of the methods used, will be included in the expedition report.

The DNA from two GoM2-2 sediment samples (H003 1H-4C and H003 25H-7C from 5.65 and 154.17 mbsf, respectively) was extracted using a PowerSoil DNA Extraction Kit (Qiagen) modified to include the reagent G2. This reagent masks clay microsites in the samples, thereby minimizing loss of native microbial DNA during the extraction procedure. For each sample, 0.25 to 0.4 g of sediment was used for each kit extraction, and this was replicated five times per sample to yield a total of 1.25 to 2.0 g of extracted sediment. The extracted DNA from all of the replicates of a single sediment sample was then pooled, precipitated, and concentrated 10-fold compared to the initial concentration.

Prior to DNA precipitation and concentration, the genomic DNA (gDNA) was too low to quantify from either of these samples. However, steps taken to increase the quantity of sample extracted, to mask clay microsites that bind nucleic acids, and to concentrate the DNA yielded quantifiable amounts of DNA. These early results are promising as some DNA was recovered from the 154-meter-deep sample. Extracted gDNA concentrations from H003 1H-4C and H003 25H-7C totaled 0.28 and 0.35 µg mL-1, respectively, and these values compare favorably to other low-biomass systems with which we have worked. DNA levels still need to be compared to controls and samples with known levels of DNA and tested by polymerase chain reaction to assure that the DNA can be amplified.

Other microbiology labs that received GoM2-2 samples (Reese Lab, Dauphin Island Sea Lab; Clara-Saracho lab, The University of Texas at Austin; Morono lab, JAMSTEC; and Ruff lab, Marine Biological Laboratory) are all in the early stages of sample analysis and have yet to report results.

Figure 1-11. Enclosure in OSU Geomicrobiology lab designed to minimize lab-borne contaminants during processing of GoM2-2 samples

1.2.2.5.5 *Geochemistry*

1.2.2.5.5.1 Pore Water Geochemistry

UW attempted to measure SO_4, Cl, and Br pore water content and assess pore water contamination. Unfortunately, the UW ion chromatograph was down and could not be brought to working condition despite UW PI and student working through the holidays.

1.2.2.5.5.2 Gas Geochemistry

Gas chromatography of GOM2-2 gas samples was started at Ohio State and USGS Woods Hole. Results will be available next quarter.

1.2.2.5.5.3 Sediment Geochemistry

Preliminary Elemental analysis of bulk sediment from conventional whole round squeeze cakes (n=25) was completed at UNH (Figure 1-12, Figure 1-13).

Preliminary TOC

Total organic carbon (TOC) measurements vary between 0.84 wt % and 1.72 wt %, with a mean of 1.19 wt.% (1σ = 0.22 wt%) with the variation in the TOC content throughout the hole driven largely by the relative contributions and dilution effects of pelagic versus hemipelagic sedimentation. The origin of the TOC is determined initially by its atomic TOC/TN. The mean atomic TOC/TN is 15.59 (1σ = 3.42) and ranges from 10.40 to 23.79. The TOC/TN measurements document a mixed origin for the TOC from both terrestrial and marine organic carbon. The $CaCO_3$ content throughout the hole is generally high and variable, with a mean of 14.59 wt% (1σ =5.57) and a range of 1.50 to 26.82 wt%. These amounts and presence are consistent with detrital carbonate lithic fragments, foraminifera, and calcareous nannofossils observed in smear slides (see Lithostratigraphy).

Preliminary TS

Total Sulfur (TS) measurements throughout the Hole are variable, with a mean of 0.49 wt. % (1σ =0.68) and range of 0.07 wt. % to 3.14 wt. %). Intervals of elevated TS relative to a low background level may be diagnostic of sulfides produced via AOM (e.g., Peketi et al. (2012) and Borowski et al. (2013)). Cyclic variation in TS in the upper 150 meters of the hole H003 also appears to be anticorrelated with magnetic susceptibility suggesting AOM influenced diagenesis in this interval (Johnson et al., 2021). AOM diagenetic overprints occurred in the presence of pore water sulfate and methane and thus occurred during early diagenesis, prior to compaction/dewatering.

Preliminary TS vs TOC

In marine sediments, both organoclastic sulfate reduction (OSR) and anaerobic oxidation of methane (AOM) produce hydrogen sulfide, which in the presence of reactive iron, can precipitate pyrite, greigite, and iron monosulfide minerals (Johnson et al., 2021; Larrasoaña et al., 2007; Riedinger et al., 2005). As observed in modern seafloor methane-seep environments and at SMTZs (e.g., Kaneko et al. (2010) and Sato et al. (2013)), measurements of TS are elevated relative to that expected to be produced by OSR (Berner and Raiswell, 1983). This excess TS is driven by methane transported toward the SMTZ, where it is consumed during AOM. In Hole H003 we observed excess TS relative to TOC (data points above the typical marine sediment line of Berner and Raiswell (1983)) that is consistent with the occurrence of early, AOM related, diagenesis in the sediments (Figure 1-12). In Hole H003, low TS data points (relative to TOC) below the Berner and Raiswell (1983) line and close to the marine phytoplankton end member TS/TOC relationship of Suits and Arthur (2000) (Figure 1-13), suggest a dominance of OSR for these sediment samples.

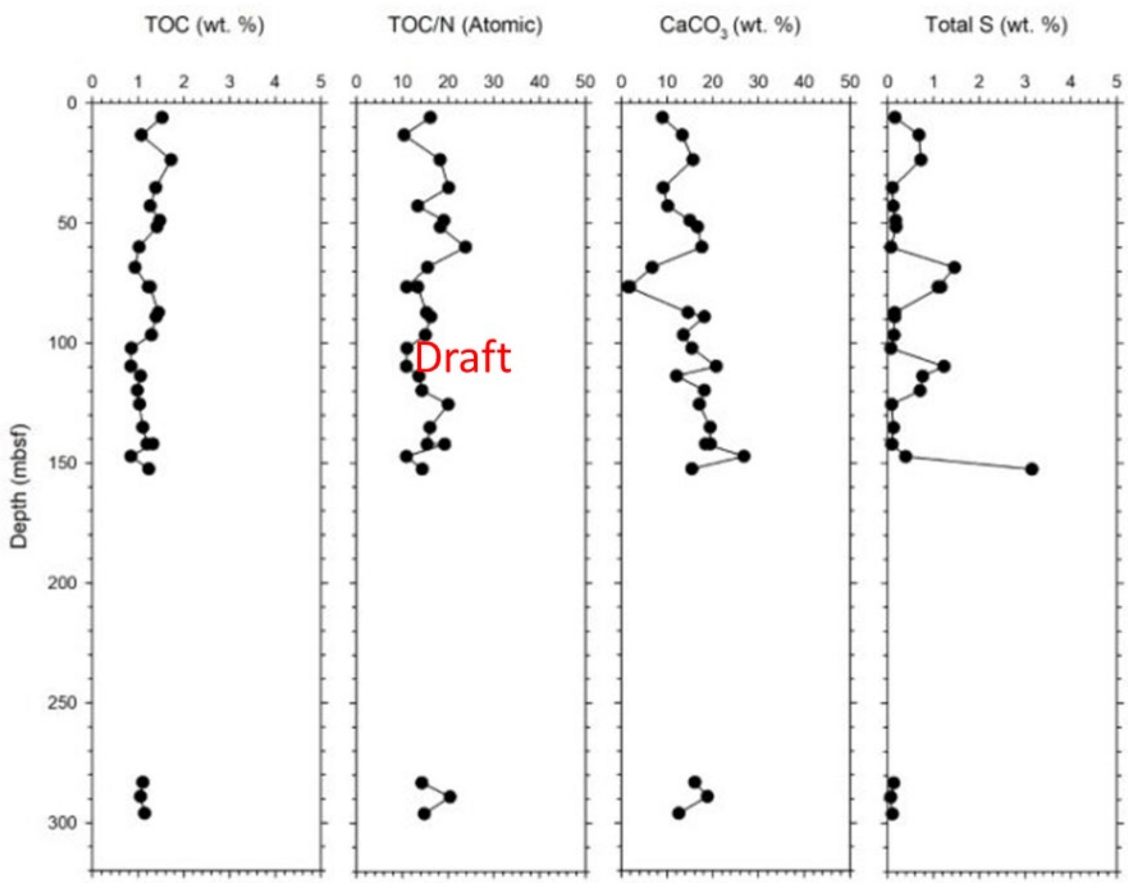

Figure 1-12. Preliminary Downhole CHNS element analysis results (WR313 H003)

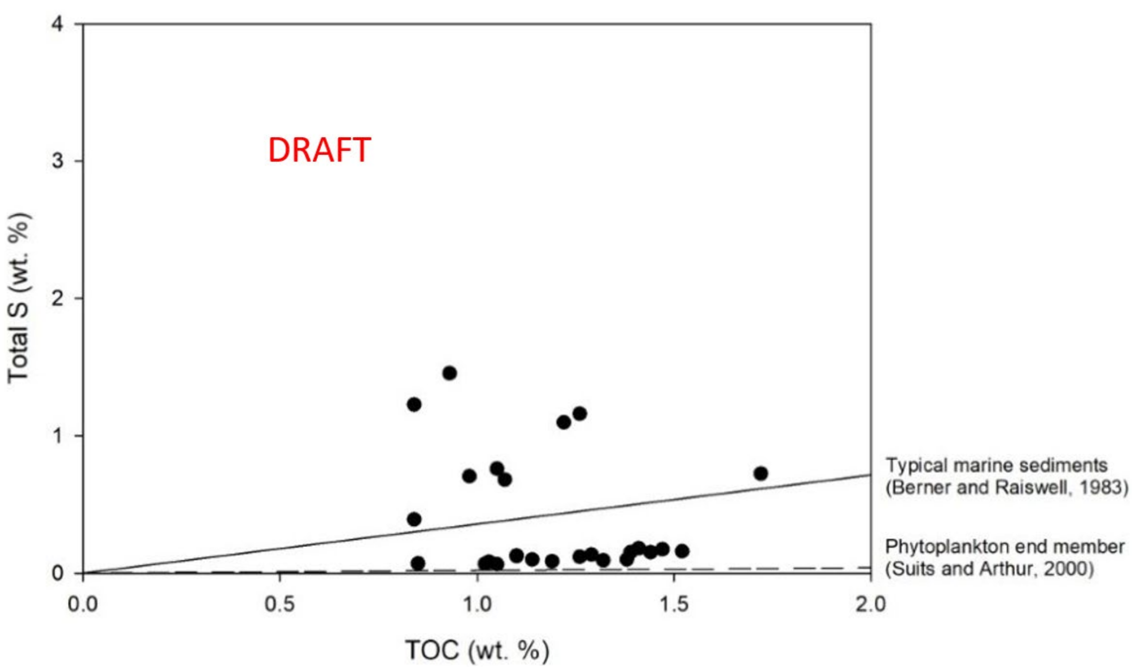

Figure 1-13. Preliminary Total Sulfur vs Total Organic Carbon Cross-plot (WR313 H003).

1.2.2.6 Task 18.0 – Project Data Analysis and Reporting

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

14 sample requests were received by UT prior to the expedition. Samples were delivered to meet 12 of the requests and 2 requests were withdrawn.

No special data requests were received. All data is available to the science team via password protected websites. When the full expedition report is published (estimated Dec 31, 2024) the data will be archived and made public.

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

The science team collaborated on drafts of UT-GOM2-2 Preliminary Summary and full Expedition Report. The Preliminary summary is the first high-level report from the expedition and is more operational in nature. The full Expedition report includes four chapters: Chapter 1 Initial Expedition Summary; Chapter 2 Methods, Chapter 3 H003, and Chapter 4 H002. Longer-term scientific results and interpretation will be reported in journal articles and data reports.

- Ohio State with contributions from all others completed a major draft of the expedition report methods.
- USGS drafted and UT updated an initial operations report for H002 and H003.
- Work started at UT on core to LWD correlations based on the H003 deviation using seismic and other data. Ohio State is also working on a Techlog Project to integrate the well log and core data.
- UT is also reviewing the GOM2-2 mud program.
- Ohio State drafted section of the expedition report including: conventional coring, core logging, undrained strength, and others.
- Oregon State drafted the microbiology section of the report
- UW, USGS, and UNH drafted Geochemistry sections of the report including pore water, gas, and sediment geochemistry, respectively.

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

Future Task

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.
- We will finalize Subcontract amendments for BP6.

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

- UT will continue testing steel and resedimented clay samples to refine our experimental approach to conduct uniaxial strain tests at high fluid pressure.
- 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.
- UT will continue testing the methane-water saturation vessel at high pressures. We will test the ability to generate and maintain high-pressure and the transfer to other pressurized systems (e.g., hydraulic pumps).
- UT will continue to evaluate and refine the temperature measurement capabilities of the Effective Stress Chamber test section.
- UT will continue to evaluate and pursue perfecting the uniaxial testing procedures and the upgraded Effective Stress Chamber software.

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

- Post Expedition Regulatory Compliance:
    - UT will request termination of the period of liability for RUE OCS-G 30392 and cancellation of the UT Austin's lease bond from BOEM Financial Assurance Section.
    - UT will continue work on the following BSEE well record requirements:
        - Core Reports
        - Paleontological Reports
        - Geochemical Analysis Reports

1.3.4 Task 17.0 – UT-GOM2-2 Core Analysis

- UNH, USGS, and UT will continue sedimentology work on discrete samples of sediment.
- Tufts will continue index property measurements and ship a select subset of samples for x-ray powder diffraction. Tufts will select and possibly start measurement of the grain size distribution using the settling method.
- UW will get a technician in to repair the ion chromatograph and possibly restart pore water analysis by first measuring chlorinity and reassessing salinity and alkalinity measurements for contamination from drilling fluids.
- Oregon St will continue DNA extractions and amplifications.
- USGS and Ohio State will continue assessing gas sample composition and log-core correlations.

1.3.5 Task 18.0 – Project Data Analysis and Reporting

- All will continue working on the Expedition Report, currently in 4 Chapters, to be published ~ Dec 31, 2024.
- UT will publish the preliminary expedition summary

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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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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2.3.3 Expedition Report Chapters

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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.

2.5 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 5 cost summary is provided in Table 5-1.

Table 5-1. Phase 5 / Budget Period 5 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						
Non-Federal Share	$ 745,317	$ 34,398,513						
Total Incurred Cost	$ 3,617,037	$ 104,986,589						
Variance								
Federal Share	$ 2,316,395	$ (502,979)						
Non-Federal Share	$ 462,762	$ 2,034,882						
Total Variance	$ 2,779,157	$ 1,531,902						

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								
Non-Federal Share								
Total Incurred Cost								
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
BSEE	Bureau of Safety and Environmental Enforcement
CFR	Code of Federal Regulation
CHNS	Carbon, Hydrogen, Nitrogen, Sulfur
CMT	Cement
CPP	Complimentary Project Proposal
CT	Computed Tomography
DNA	Deoxyribonucleic Acid
DOE	U.S. Department of Energy
DST	Data Storage Tag
GC	Green Canyon
GHSZ	Gas Hydrate Stability Zone
HSTB	Hydrate Stability Temperature Boundary
IODP	International Ocean Discovery Program
JIP	Joint Industry Project
LDEO	Lamont-Doherty Earth Observatory
LF	Low Frequency
LWD	Logging While Drilling
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NMR	Nuclear Magnetic Resonance
NTL	Notice to Lessees
OCS	Outer Continental Shelf
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

RUE	Right-of-Use and Easement
SMTZ	Sulfate-Methane Transition Zone
SOPO	Statement of Project Objectives
TN	Total Nitrogen
TOC	Total Organic Carbon
TS	Total Sulfur
UNH	University of New Hampshire
USGS	United States Geological Survey
UT	University of Texas at Austin
UW	University of Washington
WOB	Weight on Bit
WR	Walker Ridge
XCT	X-ray Computed Tomography

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