Appendix B. Daily Science Reports

This appendix contains copies of the expedition daily science reports.

Contents

30-July-2023

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 30-July-2023, 0000-2400hr

2. LOCATION:
0000-2400 hr, 30-July-2023
Hole: *Helix D/V Q4000* located approximately 21 nm north of the proposed location of Hole WR313 H003
Water depth: NA
Per Datum: NA
Lat 26 52.6378N, Long 091 21.1398W

3. DESCRIPTION OF OPERATIONS:
0000-0400 *Harvey Hermes Supply Vessel* transited from Port Fourchon (departed at 07:30 hr on 29-July-2023) to the UT-GOM2-2 Coring Expedition equipment/supplies transfer site located approximately 21 nm north of the proposed location of Hole WR313 H003.
0400-0700 *Harvey Hermes Supply Vessel* drew alongside the *Helix D/V Q4000*.
0700-0715 Conducted personal transfer (4 Geotek and 2 Science staff).
0715-2400 Conducted equipment/supplies and mud/fuel transfer. Completed multiple lifts and transfers to the *Helix D/V Q4000* of Geotek coring containers, associated core analysis laboratories, drill pipe, and associated drilling equipment, and other related consumables.
0915-1030 Helicopter crew Transfer #1 from Bristow Houma Heliport (Houma, LA) to ship transfer site (2 Geotek, 2 Fugro, 2 SLB, and 1 Science staff).
0945-1100 Helicopter Transfer #2 from Bristow Houma Heliport (Houma, LA) to ship transfer site (7 Geotek, and 1 Science staff).
1315-1430 Helicopter Transfer #3 from Bristow Houma Heliport (Houma, LA) to ship transfer site (7 SLB).
1325-1440 Helicopter Transfer #4 from Bristow Houma Heliport (Houma, LA) to ship transfer site (8 Science staff).

4. OPERATIONAL PLAN (Next 24 Hours):
Continue to transfer coring equipment and core analysis laboratories, and other related consumables from the *Harvey Hermes Supply Vessel* to the *D/V Q4000.* Once transfer is complete, transit to the WR313 H003 location.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA

G-APC Coring Totals: NA
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Upon arrival on the *Helix D/V Q4000*, members of the Science Party and Geotek staff participated in mandatory shipboard orientation and safety training. The shipboard Scientific Party was also able to access the laboratory containers that had been transferred to the *Helix D/V Q4000* and start the process of unpacking the required coring and laboratory equipment and supplies. The Science Party continued to work on staffing plans, berthing arrangements, and refining core handling and processing plans in preparation for spudding of the UT-GOM2-2-H003 hole now schedule for 03-Aug-2023.

31-July-2023

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 31-July-2023, 0000-2400hr

2. LOCATION:
2400 hr, 31-July-2023
Hole: *Helix D/V Q4000* transiting from the UT-GOM2-2 Coring Expedition equipment/supplies transfer site to the surface location of Hole WR313 H003.
Water depth: NA
Per Datum: NA
Lat 26º 41.08326N, Long 091º 39.13536W

3. DESCRIPTION OF OPERATIONS:
0000-1615 Transferred drilling equipment and supplies from the *Harvey Hermes Supply Vessel* to the *Helix D/V Q4000*, including the Geotek Pressure Core Analysis and Transfer System (PCATS), drill pipe, and associated drilling equipment, and other related consumables.
1210-1325 Helicopter crew Transfer #1 from Bristow Houma Heliport (Houma, LA) to ship transfer site (5 Science staff).
1325-1400 Helicopter Transfer #2 from Bristow Houma Heliport (Houma, LA) to ship transfer site (5 Science staff).
1615-2400 The *Helix D/V Q4000* transited in DP mode (while ballasted down) at about 3 nm/hr toward Hole WR313 H003 from the UT-GOM2-2 Coring Expedition equipment/supplies transfer site which was located approximately 21 nm north of the proposed location of Hole WR313 H003.

4. OPERATIONAL PLAN (Next 24 Hours):
Complete the transit of the *Helix D/V Q4000 to the* proposed WR313 H003 hole location. Deploy the ships ROV and conduct seafloor search for the 2017 drilled WR313 H001 well head and set compact. Offset the WR313 H001 well head by 60ft to the "north" (13.34 deg) with the ROV to the well head location of the proposed Hole WR313 H003 and mark the proposed well head location with a compact. Return the ROV to the 2017 drilled WR313 H001 well head and transit south (191.54 deg) to the proposed Hole WR33 H002 well head location and mark with a compact. Conduct ROV supported acoustic surveys of the proposed WR313 drill sites.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The shipboard GOM2-2 Scientific Party continued to access the projected designated (1) Conventional Core Receiving Lab – G17, (2) Conventional Core Processing Lab – G19, and (3) Conventional Core Pore Water Labs – G20 in preparation of the planned spudding, coring, and operations associated with the UT-GOM2-2-H003 hole. These labs will be used to process and begin the analysis of the physical, chemical, and biological properties of the hydrate-bearing layers, associated with the occurrence of gas hydrates in the greater Terrebonne Basin, there by revealing the processes controlling the origin, dynamic behavior, and response of this system to perturbation. As a critical project requirement, upon arrival on the *Helix D/V Q4000*, members of the Science Party participated in mandatory shipboard orientation and safety training. The Science Party also continued to work on staffing plans, berthing arrangements, and finalizing core handling and processing plans leading the coring/drilling operations in the UT-GOM2-2-H003 hole. In addition to the planned conventional sediment coring program associated with the UT-GOM2-2 Expedition, we will also acquire cores at in-situ pressure conditions that will be analyzed with Geotek's Pressure Core Analysis and Transfer System (PCATS) systems to log and X-ray the pressure cores. PCATS will also be used to subsample the recovered pressure cores at hydrate-stable conditions, and to transfer samples to pressurized storage chambers.

Daily Report Corrections

Correction: On July 31 Helicopter crew Transfer #1 from Bristow Houma Heliport (Houma, LA) to ship transfer site transferred 4 Science staff) and Helicopter Transfer #2 from Bristow Houma Heliport (Houma, LA) to ship transfer site transferred 3 Science staff for a total of 7. The July 31 Daily report incorrectly stated transfers of 5 and 5.

1-August-2023, On Location, Mobilization

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 01-August-2023, 0000-2400hr

2. LOCATION:

2400 hr, 01-August-2023
Hole: *Helix D/V Q4000* located over the general location of Hole WR313 H001 that was previously drilled in the Walker Ridge Block 313 H during the Gulf of Mexico Gas Hydrates Joint Industry Project (JIP) Expedition II in 2009.
Water depth: NA
Per Datum: NA
Lat 26° 39' 45.89"N, Long 091° 40' 33.953"W

3. DESCRIPTION OF OPERATIONS:

0000-0100 The *Helix D/V Q4000* completed the transit to the site of Hole WR313 H001, which represents the primary reference well for the Walker Ridge Block 313 H gas hydrate research test site as established during the 2009 JIP Expedition II.

0100-0600 Successfully conducted pressure testing of the drilling system internal blowout preventers (IBOPs) and Full Opening Safety Valve (short for FOSV), and electrical line night cap.

0600-2400 After completing the transit to Walker Ridge Block 313 H gas hydrate research test site. Both of the *Helix D/V Q4000* work class ROVs (XLS09 and XLS10) were launched to conduct a systematic search for the 2009 drilled WR313 H001 well head. After completing the trip to the seafloor a circular, a slightly elevated, mound like feature was located within only several feet from the previously surveyed location of the WR313 H001 well head; at the time of this report additional seafloor surveys were being conducted to confirm the location of the WR313 H001 well head.

1900-2130 Transferred additional fuel and the required BHA coring collars from the *Harvey Ram Supply Vessel* to the *Helix D/V Q4000*. In addition, *Harvey Ram Supply Vessel* has been "rolling the mud" every 4 hours and will continue so long as they have mud onboard.

4. OPERATIONAL PLAN (Next 24 Hours):

Use the ROV *Helix D/V Q4000* to establish the location of the proposed Walker Ridge Block 313 H well locations. Complete the regulatory required ROV supported acoustic survey of the Walker Ridge Block 313 H gas hydrate research test site. Continue to makeup (MU) the PCTB-CS coring BHA and run into the hole (RIH) in preparation to conduct drill pipe test of the Pressure and Temperature Tool (T2P). Continue to MU and RIH the PCTB-CS drill string.

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The Science Party continued to refine and finalize both the conventional and pressure core handling and processing plans leading the coring/drilling operations in the UT-GOM2-2-H003 hole. In the first hole to be established at the Walker Ridge Block 313 H gas hydrate research test site (Hole UT-GOM2-2-H003), conventional cores, pressure cores, and temperature/pressure measurements will be obtained in the shallow interval. Pressure-cores will be obtained from hydrate-bearing targets (Red, Upper Blue, and/or Orange sands), bounding mud, and background mud to total depth. The depth of the target sands range from ~950 to ~2700 fbsf. The Geotek pressure Core Analysis and Transfer System (PCATS), which was transferred to the Q4000 late on 31-July-2023, was connected to ship power in order to bring online the pressure core handling and analysis capabilities of the PCATS. The Science Party continued to prepare the projected designated (1) Conventional Core Receiving Lab – G17, (2) Conventional Core Processing Lab – G19, and (3) Conventional Core Pore Water Labs – G20 in preparation for the planned conventional coring operations associated with the UT-GOM2-2-H003 hole. The Geotek technical staff completed preparation of the Conventional Core Receiving Lab (G17), which has been instrumented with the Geotek thermal infrared (IR) imaging system that will be used to image the thermal impact of gas hydrate dissociation on the recovered core. The Geotek IR imaging system consists of a computer controlled IR camera mounted on a skate that moves incrementally along the core, rapidly capturing thermal images. The thermal images allow endothermically cooled portions of the recovered cores to be quickly identified, with the final images remaining on the screens, making thermal anomalies easy to locate while the cores are marked and sampled.

2-August-2023, Mobilization

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 02-August-2023, 0000-2400hr

2. LOCATION:

2400 hr, 02-August-2023
Hole: *Helix D/V Q4000* located over the general location of Hole WR313 H001 that was previously drilled in the Walker Ridge Block 313 H during the Gulf of Mexico Gas Hydrates Joint Industry Project (JIP) Expedition II in 2009.
Water depth: NA
Per Datum: NA
Lat 26º 39.765280' N, Long 091º 40.56586' W

3. DESCRIPTION OF OPERATIONS:

0600-0700	Offload supplies from *Harvey Ram Supply Vessel*
0700-2400	The cold shuck was installed in the rig floor. The PCTB-CS bottom hole assembly (BHA) was made up (MU) and two PCTB space out tests were performed. The advanced piston corer (APC) and extended core barrel (XCB) corer were spaced out. The PCTB BHA and pipe was run in reaching ~ 2000 fbsf by 2400.
0800-2400	Both of the *Helix D/V Q4000* work class ROVs (XLS09 and XLS10) continued to work on establishing the location of the H001 well and placing marker buoys.
1200-2400	Helix troubleshooting new navigation system. GeoServices and SLB troubleshooting wireline communication issues.
2400	The *Harvey Hermes Supply Vessel* arrived at the *Helix D/V Q4000*.

4. OPERATIONAL PLAN (Next 24 Hours):

Use the ROV *Helix D/V Q4000* to establish the location of the proposed Walker Ridge Block 313 H well locations and resolve navigation issues. Complete the regulatory required ROV supported acoustic survey of the Walker Ridge Block 313 H gas hydrate research test site. Continue to RIH in preparation to conduct a full function test of the PCTB-CS.

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The Science Party continued to refine and finalize both the conventional and pressure core handling and processing plans leading the coring/drilling operations in the UT-GOM2-2-H003 hole. The Science Party ran through "dry runs" of conventional core sampling and archiving of conventional core, including sectioning, sampling whole rounds, and sampling gases. This activity led to improvements to the planned sampling plan. The Science Party continued to prepare the projected designated (1) Conventional Core Receiving Lab – G17, (2) Conventional Core Processing Lab – G19, and (3) Conventional Core Pore Water Labs – G20 in preparation for the planned conventional coring operations associated with the UT-GOM2-2-H003 hole. Work on preparing the T2P continued.

3-August-2023, Mobilization, PCTB Test

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 03-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 02-August-2023
Hole: *Helix D/V Q4000* was located over the proposed location of Hole UT-GOM2-2-H003.
Water depth: NA
Per Datum: NA
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-1433	Both of the *Helix D/V Q4000* work class ROVs (XLS09 and XLS10) continued to work on marking the location of the H001 well and the H002 and H003 locations.
0130-0830	Conduct PCTB-CS Full Function Test #1. The depth of the water core test was changed from ~500 fbsl to ~2000 fbsl due to strong currents.
0500-2000	The PCTB-CS bottom hole assembly was made up (MU) and began to run in the hole (RIH), reaching ~ 6365 fbsf by 2000 hr.
1000-1200	The *Harvey Hermes Supply Vessel* transferred supplies to *Helix D/V Q4000*.
2315-2400	Held JSA with Geotek and SLB slickline then prepared equipment for upcoming test run.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue to MU and RIH the PCTB-CS BHA in preparation to conduct drill pipe test of Pressure Deployment Tool (PDT/T2P).

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES
The Science Party continued to refine and finalize both the conventional and pressure core handling and processing plans leading the coring/drilling operations in the UT-GOM2-2-H003 hole. The Conventional Core Receiving Lab – G17, Conventional Core Processing Lab – G19, and Conventional Core Pore Water Labs – G20 are ready to receive cores. The Science Party worked on setting up gas sampling equipment in the Pressure Core Degassing Van – R17. Work on preparing the

T2P continued. Scientists involved in microbiology and pore water chemistry coordinated collection of drilling fluid samples for contamination control with M-I SWACO.

4-August-2023, T2P test, Spud H003, Cores H003-01H to H003-02H

Daily Operational and Science Report Revision 1
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 04-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 04-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003.
Depth Below Rig Floor (RKB): 6506
Per Datum: 52 ft
Water depth: 6454 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400	At Hole UT-GOM2-2-H003.
0000-0600	Executed a test of the PDT/T2P (Probe Deployment Tool). This test was not successful. The tool detached at the rig floor while hanging in the drill pipe. It fell to the bottom of the hole and landed in the BHA (bottom hole assembly). The PDT/T2P was successfully fished from the bottom of the hole without incident. The cause of the detachment of the PDT/T2P is being examined at this time.
0900-1200	BSSE (Bureau of Safety and Environmental Enforcement) made an unannounced inspection of the Q4000 and associate UT program efforts. BSEE did not identify any significant operator concerns
1130-1200	Lowered drill string down to 6,506' to tag mud line then picked up to 6,500.'
1223	GAPC fired with 2,300 psi and 7.6 bbls pumped.
1250	Core UT-GOM2-2-H003-01H arrived on deck: 0.0 ft to 27.0 ft: Recovered 24.67 ft
1907	GAPC fired with 2,100 psi and 4.9 bbls pumped: Core UT-GOM2-2-H003-02H, 27.0 ft to 55 ft: Recovered 32.79 ft

4. OPERATIONAL PLAN (Next 24 Hours):
Continue with APC Core UT-GOM2-2-H003-03H and PCTB Core UT-GOM2-2-H003-04PC.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: UT-GOM2-2-H003
G-APC Coring Totals: Core UT-GOM2-2-H003-01H: 24.67 ft recovered core (93% recovery)
Core UT-GOM2-2-H003-02H: 32.24 ft recovered core (118% recovery)
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals: NA
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The pipe tally with the bit on the seabed was 6506 ft corresponding to 6454 ft water depth and 52 ft rig floor height above water. The Science Party and Geotek fully sectioned Core UT-GOM2-2-H003-01H and Core UT-GOM2-2-H003-02H after infrared core scanning. Whole round sections for pore water and microbiology were collected and are being processed in the core processing and pore water labs. Headspace gas samples were also collected. The first three piston cores are being sampled at a high resolution (one set per section) for the standard sample set (pore water, microbiology, physical properties, headspace gas) in order to identify the depth of the sulfate-methane transition zone (SMTZ) and characterize biogeochemical processes in the shallow interval. Vane shear and pocket penetrometer were measured on the end of each section.

Core H003-02H being sectioned in the Core Receiving Lab.

View from the Doghouse

5-August-2023, Cores H003-03H to H003-07H

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 05-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 05-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

Last Drill/ Core depth: 6659 ft RKB

RKB to Mud Line: 6506 ft on drill pipe measurement
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:
0000-2400 At Hole UT-GOM2-2-H003.
0000-0130 Core UT-GOM2-2-H003-03H, 61.0 to 89.0 fbsf
0230-0830 Core UT-GOM2-2-H003-04CS, 89.0 to 99.0 fbsf
0930-1330 Core UT-GOM2-2-H003-05CS, 99.0 to 106.0 fbsf
1400-1655 Core UT-GOM2-2-H003-06H, 106.0 ft to 129.0 fbsf
2020-2309 Core UT-GOM2-2-H003-07H, 129.00 ft to 153.00 fbsf

4. OPERATIONAL PLAN (Next 24 Hours):
Continue conventional and pressure coring operations in Hole UT-GOM2-2-H003 from the current hole depth of 147.00 fbsf with the following planned core runs:
Core UT-GOM2-2-H003-08CS, 153.0 to 163.0 fbsf
Core UT-GOM2-2-H003-09H, 163.0 to 186.0 fbsf
Core UT-GOM2-2-H003-010H, 186.0 to 209.0 fbsf
Core UT-GOM2-2-H003-011H, 209.0 to 232.0 fbsf
Core UT-GOM2-2-H003-012H, 232.0 to 255.0 fbsf

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: UT-GOM2-2-H003
G-APC Coring Totals:
Core UT-GOM2-2-H003-03H: 32.79 ft recovered core (120% recovery)
Core UT-GOM2-2-H003-06H: 33.43 ft recovered core (149% recovery)
Core UT-GOM2-2-H003-07H: 27.7 ft recovered core (115% recovery)
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals:
Core UT-GOM2-2-H003-04CS:10.40 ft (106% recovery), 0 psi
Coring F 6595'- T 6605' (RKB) at 20 rpm w/ 1-2 K torque circulating 8.6 ppg SW at 1 bpm w/ 30 psi standpipe. Maintaining 1-5K on bit.
Core UT-GOM2-2-H003-05CS: 7.35 ft (107% recovery), 3475 psi

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Coring F 6605"- T 6612' (RKB) at 60 RPM w/ 3K torque and cementer circulating 8.6 ppg SW at 3.5 bpm w/ 210 psi while maintaining 1-5K on bit.

G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3):

Core UT-GOM2-2-H003-03H – 5 min dwell time
Core UT-GOM2-2-H003-06H – 10 min dwell time
Core UT-GOM2-2-H003-07H – 10 min dwell time

8. SCIENCE ACTIVITES

The Science Party and Geotek fully processed and subsampled the three G-APC cores as acquired over the last 24 including Cores UT-GOM2-2-H003-03H, - 06H, and -07H. In each case, after conducting a continuous infrared (temperature) scan of each of the recovered conventional cores, whole round core sections were collected for shipboard and post-expedition pore-water and microbiologic analysis. Headspace gas and micropalcontology samples were also collected from each of the recovered conventional cores. Core UT-GOM2-2-H003-03H was the last core to be sampled at the highest vertical resolution, with the acquisition of the standard set of whole round interstitial water, microbiological, and organic geochemical headspace gas samples from every 59 inch long core section.

The acquisition of the first pressure core during the GOM2-2 Expedition, Core UT-GOM2-2-H003-04CS, recovered 10.40 ft of core material; however, the ball valve failed to fully close. Visual inspection of the recovered G-PCTB-CS coring tool revealed that the lower ball valve assembly was packed off with a "sticky" clay debris that appears to have prevented the G-PCTB-CS from sealing. The decision was made to change the core plan to include an additional deployment of the G-PCTB-CS (i.e., Core UT-GOM2-2-H003-05CS) to obtain much needed information on the near-surface hydrocarbon gas concentrations and compositions. In the case of the Core UT-GOM2-2-H003-05CS, considerable effort was made to clean out the bottom of the hole before acquiring the pressure core by pumping 5 bbls of 10.5 ppg Hi-Vis sweep to clean the hole. Upon examination in the Geotek PCATS system, it was determined that Core UT-GOM2-2-H003-05CS recovered 7.35 ft of core and was sealed at an internal pressure of 3475 psi, which was near the pre-set G-PCTB-CS boost pressure. Near the end of the day, Core UT-GOM2-2-H003-07H also recovered 27.79 ft of sediment.

6-August-2023, Core H003-08CS, Wireline Separation

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 06-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 06-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

- **Total Depth:**
- Last Drill/ Core depth 6,659'RKB

RKB to Mud line 6,506' on Drill pipe measurements.
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400	At Hole UT-GOM2-2-H003
0000-0330	Prepare to run Core UT-GOM2-2-H003-08CS, 153-163 fbsf
0330	SLB Slickline line parted while resetting zero at surface after installing PCTB-CS retrieval tool
0415	SLB conducted slip/cut of the core retrieval Slickline, M/U new rope socket and fishing assembly
0900	RIH the pulling tool to depth and set down on Fish and POOH to the surface
1145	RIH Geotek Emergency core barrel pulling tool
1200-1230	Pulling tool latched into the PCTB-CS. However, the PCTB-CS could not be removed from the BHA. It was interpreted that the PTCB was 'mud/sand jammed' in BHA.
1330-1430	M/U TDS to drill string then POOH from 6618 ft RKB. No over pull noted
1430	Decision made to POOH with drill string
1515	POOH from 6616 to 6176 ft RKB while laying down the 7th double it was noted that the string was no longer wet. This indicates that there was, once again, circulation inside the pipe.
1600-1730	M/U TDS to the drill string then pumped at 8 bpm with 300 psi down drill string with noticeable dirty fluid coming out PCTB cutting shoe.
1830-2000	Geotek Emergency core barrel pulling tool was RIH and latched into PCTB tool. PCTB tool was easily POOH.
2000-2100	TDS was connected to the drill string then pumped at 7 bpm with 60 psi to clean up the out PCTB cutting shoe
2218	In preparation to re-enter Hole UT-GOM2-2-H003, Geotek center bit was deployed
2315-2400	Ran the cement pump at 10 bpm (100 psi) attempting to seat center bit in the PCTB cutting shoe

4. OPERATIONAL PLAN (Next 24 Hours):
Continue conventional and pressure coring operations in Hole UT-GOM2-2-H003 from the current hole depth of 153.00 fbsf with the following planned core runs:
Core UT-GOM2-2-H003-08CS, 153.0 to 163.0 fbsf
Core UT-GOM2-2-H003-09H, 163.0 to 186.0 fbsf
Core UT-GOM2-2-H003-010H, 186.0 to 209.0 fbsf

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Core UT-GOM2-2-H003-011H, 209.0 to 232.0 fbsf
Core UT-GOM2-2-H003-012H, 232.0 to 255.0 fbsf

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003
G-APC Coring Totals:
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals:
Core UT-GOM2-2-H003-08CS: Failed deployment of G-PCTB coring tool
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Core UT-GOM2-2-H003-05CS was scanned in the Geotek Pressure Core Analysis and Transfer System (PCATS) and cut into two sections for onboard quantitative degassing. PCATS allows the full core to be transferred from the PCTB, and then X-ray imaged and scanned for bulk density (gamma ray attenuation) and compressional wave (P-wave) velocity. The scanned core can then be cut into sections and transferred into 35 or 120 cm long pressurized storage chambers. The Science Party and Geotek will develop a cut plan for each scanned pressure core to decide sections to be cut for onboard depressurization or storage for onshore analysis.

Processing of the APCT-3 temperature response from Cores UT-GOM2-2-H003-03H, UT-GOM2-2-H003-06H, and UT-GOM2-2-H003-7H resulted in the first three temperature profile points. The G-APC tool can be fitted with an instrumented coring shoe, called the APCT-3, that measures temperature. During the piston coring stroke, the APCT-3 remains in the sediment for ~10 mins, and the measured temperature response is used to calculate the formation temperature. A profile of temperature measurements will allow for the calculation of the geothermal gradient at the site.

Processing of pore water and microbiology samples from conventional cores continued in the Pore Water and Core Processing Labs. These labs also processed contamination control samples from drilling fluid and PCATS.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCTB-CS	Pressure Coring Tool with Ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	wireline used to deploy and recover core, etc.

TDS Top Drive System

Camila Van Der Maal (UT Austin) and Kelly Shannon (Oregon State) in the microbiology lab.

7-August-2023, Re-Enter Hole, Cores H003-09H to H003-10H

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 07-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 07-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

Last Drill/Core depth: 6715 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:
0000-2400 At Hole UT-GOM2-2-H003
0000-0700 M/U drill string to TDS and RIH SLB Slickline w/ Geotek Center Bit
0700-0800 Move rig into position over WR 313 H003 and re-enter mudline at 6506 ft RKB
0800-1100 Wash and ream F/ 6506 ft RKB T/ 6659 ft RKB (TD)
1100-1300 Retrieve Geotek Center Bit
1300-1500 Prepare to run G-PCTB-CS
1500-1530 Acquire Core UT-GOM2-2-H003-08CS, 153.0 to 163.0 fbsf
1530-1700 POOH G-PCTB-CS and transfer to the Geotek pressure core processing van
1700-1825 Prepare to run G-APCT coring tool
1825-1930 Acquire Core UT-GOM2-2-H003-09H, 163.0 to 186.0 fbsf
1930-2030 POOH G-APCT coring tool and transfer to the Geotek pressure core processing van
2030-2158 Prepare to run G-APCT coring tool
2158-2028 Acquire Core UT-GOM2-2-H003-10H, 186.0 to 209.0 fbsf
2028-2400 POOH G-APCT coring tool and transfer to the Geotek pressure core processing van

4. OPERATIONAL PLAN (Next 24 Hours):
Continue conventional and pressure coring operations in Hole UT-GOM2-2-H003 from the current hole depth of 209.00 fbsf with the following planned core runs:
Core UT-GOM2-2-H003-011H, 211.0 to 236.0 fbsf
Core UT-GOM2-2-H003-012H, 236.0 to 261.0 fbsf
Core UT-GOM2-2-H003-13CS, 261.0 to 271.0 fbsf

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: UT-GOM2-2-H003
G-APC Coring Totals:
Core UT-GOM2-2-H003-09H: 28.62 ft recovered core (127% recovery)
Core UT-GOM2-2-H003-10H: 29.65 ft recovered core (118% recovery)
G-XCB Coring Totals: NA

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G-PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-08CS: 7.89 ft (81% recovery), 2075 psi

Coring F 6659 ft – T 6669 ft (RKB) at 60 rpm w/ 2-4 K torque circulating 8.6 ppg SW at 2 bpm w/ 63 psi standpipe. Maintaining 1-5K on bit.

G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3):

Core UT-GOM2-2-H003-09H – 10 min dwell time

Core UT-GOM2-2-H003-010H – 10 min dwell time

8. SCIENCE ACTIVITES

Operations and science activities over the last 24-hours focused on tripping into Hole UT-GOM2-2-H003 from a depth of 6506 ft RKB (mud line) to the previously completed total depth of the hole to 6659 ft RKB by 1300 hr. Processing of pore water and microbiology samples from previous cores continued.

Pressure core section UT-GOM2-2-H003-05CS-2 was quantitatively degassed to calculate the dissolved methane concentration, and gas samples were collected. After quantitative degassing, core section UT-GOM2-2-H003-05CS-2 was sub-sectioned for porewater and microbiology samples in the Core Receiving Lab. Sections that are quantitatively degassed are processed section-by-section as conventionalized core in the Core Receiving Lab. Water from PCATS, spiked with a contamination tracer, is collected as a contamination control.

Core UT-GOM2-2-H003-08CS is currently being scanned in PCATS.

Core UT-GOM2-2-H003-09H and Core UT-GOM2-2-H003-10H were infrared scanned, sectioned and sampled for the standard sampling set in the Core Receiving Lab. Each section was measured with vane shear and pocket penetrometer. Both cores were expansive and were sampled for void gas.

Analysis of in-situ measurements derived from APCT-3 deployments continued. New temperature measurements at Core UT-GOM2-2-H003-09H and Core UT-GOM2-2-H003-010H were made. The interpreted temperature gradient is 21.6 deg. C per km and the seafloor temperature is 4.5 deg. C.

The Scientific Party continued to write methods and Hole H003 chapters of the Expedition Report.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

8-August-2023, Cores H003-11H to H003-15CS

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 08-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 08-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

Last Drill/Core depth: 6806 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:
0000-2400 At Hole UT-GOM2-2-H003
0000-0100 Continue the recovery Core UT-GOM2-2-H003-10H as acquired on 07-AUG-2023
0100-0330 Prepare and RIH the G-APCT coring tool
0330-0345 Acquire Core UT-GOM2-2-H003-11H, 209.0 to 232.0 fbsf
0345-0430 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
0430-0645 Prepare and RIH the G-APCT coring tool
0645-0700 Acquire Core UT-GOM2-2-H003-12H, 232.0 to 255.0 fbsf
0700-1100 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
1100-1530 Prepare and RIH G-PCTB-CS
1530-1600 Acquire Core UT-GOM2-2-H003-13CS, 255.0 to 265.0 fbsf
1600-1620 POOH G-PCTB-CS and transfer to the Geotek Pressure Core Processing van
1620-1716 Prepare and RIH the G-APCT coring tool
1716-1726 Acquire Core UT-GOM2-2-H003-14H, 265.0 to 290.0 fbsf
1726-1935 POOH G-PCTB-CS and transfer to the Geotek Core Processing Van
1935-2000 Prepare and RIH G-PCTB-CS
2000-2130 Acquire Core UT-GOM2-2-H003-15CS, 290.0 to 300.0 fbsf
2130-2400 POOH G-PCTB-CS and transfer to the Geotek Pressure Core Processing Van

4. OPERATIONAL PLAN (Next 24 Hours):
Continue conventional and pressure coring operations in Hole UT-GOM2-2-H003 from the current hole depth of 300.00 fbsf with the following planned core runs:
Core UT-GOM2-2-H003-016H, 300.0 to 321.0 fbsf
Core UT-GOM2-2-H003-017H, 321.0 to 342.0 fbsf
Core UT-GOM2-2-H003-018H, 342.0 to 364.0 fbsf
Core UT-GOM2-2-H003-19CS, 364.0 to 374.0 fbsf
Core UT-GOM2-2-H003-020H, 374.0 to 399.0 fbsf

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

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6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals:

Core UT-GOM2-2-H003-11H: 30.31 ft recovered core (132% recovery)
Core UT-GOM2-2-H003-12H: 32.28 ft recovered core (132% recovery)
Core UT-GOM2-2-H003-14H: 30.20 ft recovered core (124% recovery)

G-XCB Coring Totals: NA

G-PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-13CS: 1.60 ft (16% recovery), 3531 psi
Coring F 6761 ft – T 6771 ft (RKB) at 60 rpm w/ 2-4 K torque circulating 8.6 ppg SW at 2 bpm w/ 63 psi standpipe. Maintaining 1-5K on bit.
Core UT-GOM2-2-H003-15CS: 11.3 ft (115% recovery), 0 psi
Coring F 6771 ft – T 6796 ft (RKB) at 60 rpm w/ 1-3 K torque circulating 8.6 ppg SW at 2 bpm w/ 190 psi standpipe. Maintaining 1-3K on bit.

G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3):

Core UT-GOM2-2-H003-012H – 10 min dwell time
Core UT-GOM2-2-H003-014H – 10 min dwell time

8. SCIENCE ACTIVITES

Operations and science activities over the last 24-hours focused advancing Hole UT-GOM2-2-H003 from a depth of 209 fbsf (6715 ft RKB) to a total depth of 300 fbsf (6806 ft RKB) by the deployment of three conventional piston cores (G-APC) and two pressure cores (G-PCTB-CS). This combination of conventional and pressure cores targeted a prominent well log derived density transition that was identified in the logging while drilling (LWD) data as acquired in the WR313H-001 well during the 2009 Joint Industry Project Expedition II.

Core UT-GOM2-2-H003-11H, -12H, and -14H were processed thorough the Geotek Core Receiving Lab using the standard approach developed for gas hydrate research expeditions that start with the full core infrared scan of the recovered core to identify cold sections of the core that often indicate the presence of dissociating gas hydrates. The core infrared scans were used to guide the collection of void gas samples, cutting of whole-round (WR) sample sets, collecting headspace sediment, collecting hydrate-bearing sediment samples, hand measurements of sediment strength, microbiological WR sub-coring, headspace gas sediment preservation, and processing of drilling fluid and PCATS water samples.

Pressure core section UT-GOM2-2-H003-05CS-2 was quantitatively degassed to calculate the dissolved methane concentration, and gas samples were collected. Core UT-GOM2-2-H003-13CS is being scanned in PCATS.

The Scientific Party continued to work on writing methods and Hole H003 chapters of the Expedition Report.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up

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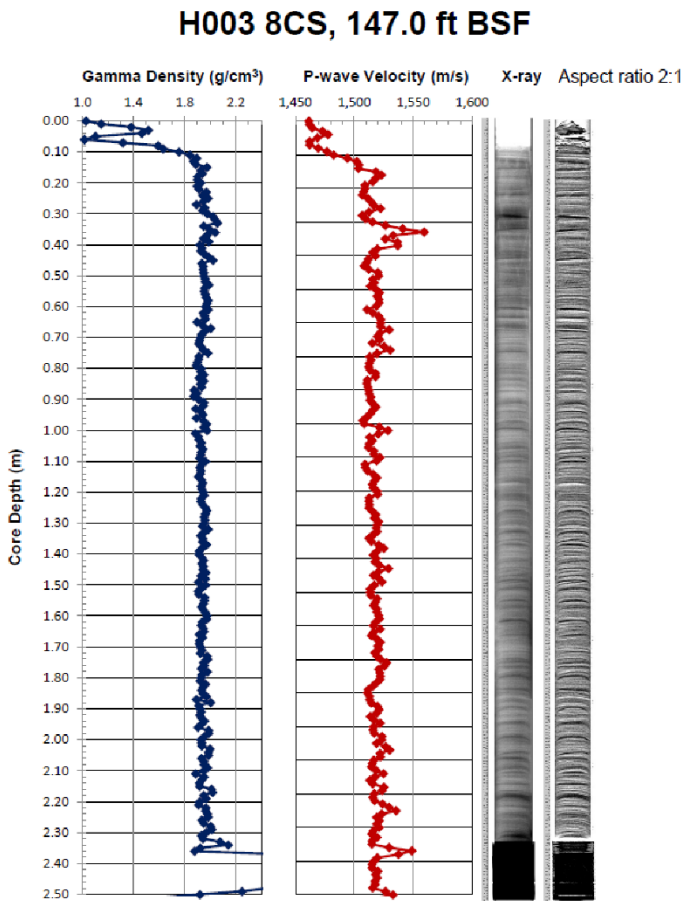
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system



X-ray, P-wave velocity, and density of Core UT-GOM2-2-H003-08CS from the Geotek Pressure Core Analysis and Transfer System (PCATS). The X-ray reveals thin interbedding throughout the entire core.

9-August-2023, Cores H003-15CS to H003-22H

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 09-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 09-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

Last Drill/Core depth: 6955 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:
0000-2400 At Hole UT-GOM2-2-H003
0000-0030 Continue to RIH G-PCTB-CS
0030-0100 Acquire **Core UT-GOM2-2-H003-15CS**, 290.0 to 300.0 fbsf
0100-0145 POOH G-PCTB-CS and transfer to the Geotek Pressure Core Processing Van
0145-0315 Prepare and RIH the G-APCT coring tool
0315-0330 Acquire **Core UT-GOM2-2-H003-16H**, 300.0 to 321.0 fbsf
0330-0400 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
0430-0600 Drill out cored section to 321 fbsf
0600-0700 Prepare and RIH the G-APCT coring tool
0700-0715 Acquire **Core UT-GOM2-2-H003-17H**, 321.0 to 342.0 fbsf
0715-0800 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
0800-0900 Drill out cored section to 342 fbsf
0900-1000 Prepare and RIH the G-APCT coring tool
1000-1015 Acquire Core **UT-GOM2-2-H003-18H**, 342.0 to 364.0 fbsf
1015-1100 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
1100-1300 Drill out cored section to 364 fbsf
1300-1430 Continue to RIH G-PCTB-CS
1430-1500 Acquire Core **UT-GOM2-2-H003-19CS**, 364.0 to 374.0 fbsf
1500-1530 POOH G-PCTB-CS and transfer to the Geotek Pressure Core Processing Van
1530-1615 Prepare and RIH the G-APCT coring tool
1615-1623 Acquire Core **UT-GOM2-2-H003-20H**, 374.0 to 399.0 fbsf
1623-1800 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
1800-1830 Drill out cored section to 399 fbsf
1830-1953 Prepare and RIH the G-APCT coring tool
1953-2000 Acquire Core **UT-GOM2-2-H003-21H**, 399.0 to 424.0 fbsf
2000-2100 POOH G-APCT coring tool and transfer to the Geotek Core Processing Van
2100-2300 Drill out cored section to 424 fbsf
2300-2343 Prepare and RIH the G-APCT coring tool
2342-2358 Acquire Core **UT-GOM2-2-H003-22H**, 424.0 to 449.0 fbsf
2358-2400 POOH G-APCT coring tool

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4. OPERATIONAL PLAN (Next 24 Hours):

Continue conventional and pressure coring operations in Hole UT-GOM2-2-H003 from the current hole depth of 449.0 fbsf with the following planned core runs:

Core UT-GOM2-2-H003-023H, 449.0 to 474.0 fbsf
Core UT-GOM2-2-H003-24CS, 474.0 to 484.0 fbsf
Core UT-GOM2-2-H003-025H, 484.0 to 509.0 fbsf (with APCT-3)
Core UT-GOM2-2-H003-026H, 509.0 to 534.0 fbsf
Core UT-GOM2-2-H003-027H, 534.0 to 559.0 fbsf
Core UT-GOM2-2-H003-028H, 559.0 to 585.0 fbsf

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003
G-APC Coring Totals:
Core UT-GOM2-2-H003-016H: 26.30 ft recovered core (128% recovery)
Core UT-GOM2-2-H003-017H: 27.7 ft recovered core (135% recovery)
Core UT-GOM2-2-H003-018H: 30.7 ft recovered core (143% recovery)
Core UT-GOM2-2-H003-020H: 29.0 ft recovered core (119% recovery)
Core UT-GOM2-2-H003-021H: 28.3 ft recovered core (113% recovery)
Core UT-GOM2-2-H003-022H: 23.8 ft recovered core (105% recovery)
G-XCB Coring Totals: NA
G-PCTB-CS Coring Totals:
Core UT-GOM2-2-H003-15CS: 11.3 ft (115% recovery), 0 psi
Coring F 6771 ft – T 6796 ft (RKB) at 60 rpm w/ 1-3 K torque circulating 8.6 ppg SW at 2 bpm w/ 190 psi standpipe. Maintaining 1-3K on bit.
Core UT-GOM2-2-H003-19CS: TBD ft (not yet in PCATS) (TBD recovery), 3533 psi
Coring F 6870 ft – T 6880 ft (RKB) at 60 rpm w/ 2-4 K torque circulating 8.6 ppg SW at 3 bpm w/ 270 psi standpipe. Maintaining 4-5K on bit.
G-PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3):
Core UT-GOM2-2-H003-017H – 10 min dwell time
Core UT-GOM2-2-H003-021H – 10 min dwell time

8. SCIENCE ACTIVITES

Scientific coring activities over the last 24-hours focused advancing Hole UT-GOM2-2-H003 from a depth of 300 fbsf (6806 ft RKB) to a total depth of 449 fbsf (6955 ft RKB) by the deployment of six conventional piston cores (G-APC) and two pressure cores (G-PCTB-CS). This combination of conventional and pressure cores targeted a series of transitional low to high density stratigraphic intervals as observed on the logging while drilling (LWD) data as acquired in the WR313H-001 well.

The conventional cores UT-GOM2-2-H003-16H, -17H, -18H, -20H, -21H, and -22H were processed thorough the Geotek Core Receiving Lab using the standard GOM2-2 core processing techniques. Laboratory measurements conducted on the acquired core material will provide important understanding

of reservoir and bounding mud properties, such as (1) hydrate concentrations, dissolved methane concentrations, and gas compositions, (2) pore water solute concentration and compositions, (3) lithofacies identification, grain size, and sorting, (4) permeability, (5) compressibility, (6) strength behavior, (7) sediment composition and age, (8) microbial communities and activity, (8) and physical properties such as mineral and clay composition, porosity, and liquid limit. Characterizing these properties will allow us to better understand fluid and gas transport processes in the greater Walker Ridge area associated with reservoirs and seals, providing insight in terms of gas migration and hydrate formation.

Pressure core sections UT-GOM2-2-H003-08CS-2 and UT-GOM2-2-H003-08CS-3 (each 120 cm) were quantitatively degassed to calculate the dissolved methane concentration, and multiple gas samples were collected. These sections were depressurized in an extra slow manner in an attempt to preserve the thin beds and laminations observed in the PCATS scans. We now have a dissolved methane profile defined by three points over two pressure cores.

The Scientific Party continued to work on writing both the "Methods" and "Hole H003" results chapters for the Expedition Report.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

10-August-2023, Cores H003-22H to H003-25H, Blower Motor Failure

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 10-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 09-August-2023
Hole: *Helix D/V Q4000* was located over the location of Hole UT-GOM2-2-H003

Last Drill/Core depth: 7015 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H003
0000-0030 POOH Core **UT-GOM2-2-H003-22H** (continuation from 10-August-2022)
0030-0100 Transfer core to the Geotek Core Processing Van
0100-0130 Drill out cored section to 449 fbsf
0130-0230 Prepare and RIH the G-APC coring tool
0230-0300 Acquire Core **UT-GOM2-2-H003-23H**, 449.0 to 474.0 fbsf
0300-0400 POOH G-APC coring tool and transfer to the Geotek Core Processing Van
0400-0500 Drill out cored section to 474 fbsf
0500-0730 RIH PCTB-CS
0730-0800 Acquire Core **UT-GOM2-2-H003-24CS**, 474.0 to 484.0 fbsf
0800-0815 POOH PCTB-CS and transfer to the Geotek Pressure Core Processing Van
0815-0900 Prepare and RIH the G-APC coring tool
0900-0905 Acquire Core **UT-GOM2-2-H003-25H**, 484.0 to 509.0 fbsf
0905-0945 POOH G-APC coring tool with APTC-3 and transfer to the Geotek Core Processing Van
0945-1100 Drill out cored section to 509 fbsf
1100-1130 Circulate and condition hole
1130-1200 Trouble Shoot TDS -- shutting down while rotating
1200-1215 Found blower motor not working
1215-1545 Condition hole and remove blower
1545-2400 Monitor well while circulating/conditioning and reciprocating

4. OPERATIONAL PLAN (Next 24 Hours):
Continuing to conduct repairs on the TDS, while circulating/conditioning and reciprocating the drill string.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

UT-GOM2-2_Daily_Science_Report_08_10_23_Final

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals:

Core UT-GOM2-2-H003-022H: 23.8 ft recovered core (95% recovery)

Core UT-GOM2-2-H003-023H: 29.0 ft recovered core (116% recovery)

Core UT-GOM2-2-H003-025H: 34.3 ft recovered core (137% recovery)

G-XCB Coring Totals: NA

PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-24CS: 11.4 ft (114% recovery), 3091 psi

Coring F 6980 ft – T 6990 ft (RKB) at 60 rpm w/ 2-4 K torque circulating 8.6 ppg SW at 2 bpm w/ 200 psi standpipe. Maintaining 4-5K on bit.

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3):

Core UT-GOM2-2-H003-025H – 10 min dwell time

8. SCIENCE ACTIVITES

Scientific coring operations over the last 24-hours focused on advancing Hole UT-GOM2-2-H003 from a depth of 449 fbsf (6955 ft RKB) to a total depth of 509 fbsf (7015 ft RKB) by the deployment of three conventional piston cores (G-APC) and one pressure core (PCTB-CS). This combination of cores targeted a mud-rich section with the goal to further characterize the methane solubility profile within the upper stratigraphic section at the site of Hole UT-GOM2-2-H003.

One of the critical operational concerns associated with coring Hole UT-GOM2-2-H003 was the determination of the depth where the hole could no longer be safely advanced with piston style G-APC cores and the need to switch over to rotary style G-XCB coring operations. The first evidence of significant challenges associated with the G-APC coring operations was observed in Core UT-GOM2-2-H003-022H where the core contained numerous gas voids and a partially collapsed core liner. Core UT-GOM2-2-H003-022H was also expansive in nature with numerous gas voids. Core UT-GOM2-2-H003-025H marked the end of G-APC operations in Hole UT-GOM2-2-H003 where the core was again expansive throughout, exhibiting evidence of possible inflow of sediment debris into the core barrel, and the core liner proved to be very difficult to remove from the inner core barrel. The decision was made to switch from the G-APC to the G-XCB coring systems to further advance the conventional coring operations in Hole UT-GOM2-2-H003.

Repairs to the shipboard Geotek PCATS pressure core analysis system allowed the processing of the Core UT-GOM2-2-H003-19CS that was recovered on 09-AUG-2023. At the time of this report, Core UT-GOM2-2-H003-24CS was being processed through PCATS. Additional PCTB-CS acquired pressure core samples as obtained earlier in the expedition have also been transferred to the Geotek degassing van for quantitatively degassed in order to further define the dissolved methane concentration profile at the site of Hole UT-GOM2-2-H003.

After recovering Core UT-GOM2-2-H003-025H and while drilling the "rathole" section from 6990 ft RKB to 7015 ft RKB, it was discovered by Helix that the Top Drive System (TDS) was showing a "high temperature alarm" for the drill motor. Operations were halted and the crews began troubleshooting. We were able to continue circulating and reciprocating the pipe. The maintenance team discovered that the blower motor (cooling fan motor) for the drill motor had grounded. Helix did not have a spare motor onboard the Q4000. The plan is to take the blower motor to shore and repair it as rapidly as possible. The

Harvey Hermes Supply Vessel departed WR 313 with the blower motor from the Q4000 at 2220 hr, 08-AUG-23, en route HGIM dock, Port Fourchon, with an ETA 1630, 11-AUG-23.

The Q4000 is now on "Vessel, ROV & Tubular Downtime. It is estimated that the repairs to the ship will be completed in 36 to 48 hours (e.g., between 1200 hr and 2400 hr on 12-AUG-23). The SLB wireline has been rigged down and a night cap installed. We laid down a single length of drill pipe to get off bottom and are currently circulating the hole and reciprocating the pipe. We are in a good position regarding well control, at a depth ~500 fbsf below the mud-line and still able to circulate and reciprocate. The Q4000 ROV's are monitoring wellhead at the seafloor.

This afternoon, two members of the UT-GOM2-2 Science Party and an additional Helix crew member tested positive for COVID; all of the affected individuals have been quarantined where they will remain for the next five days until cleared by the vessel's medic. The Q4000 has been placed under Helix prescribed COVID protocols that include social distancing requirements and a rotational meal schedule to reduce the possibility of potential exposure.

The Scientific Party continued to work on writing both the "Methods" and "Hole H003" results chapters for the Expedition Report.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

11-August-2023, waiting on *Q4000*

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 11-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 11-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003

Last Drill/Core depth: 7015 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:
0000-2400 At Hole UT-GOM2-2-H003
0000-0130 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0130-0145 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0145-0530 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0530-0600 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0600-0930 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0930-1200 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1200-1330 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1330-1500 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1500-1730 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1730-1800 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1800-2130 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
2130-2400 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string

4. OPERATIONAL PLAN (Next 24 Hours):
Continuing to conduct repairs on the TDS, while conditioning and reciprocating the drill string.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: UT-GOM2-2-H003
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: UT-GOM2-2-H003
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

UT-GOM2-2_Daily_Science_Report_08_11_23_Final

8. SCIENCE ACTIVITES

The *Harvey Hermes Supply Vessel* arrived in Port Fourchon at 1525 hr on 11-AUG-23 and immediately transferred the damaged Q4000 TDS blower motor (cooling fan motor) to Houma Armature Works for rewinding of the motor coil. The blower motor is expected to be returned to the Q4000 between 1200 hr and 2400 hr on 12-AUG-23 (via helicopter). We are currently circulating the hole and running regularly scheduled Hi-Vis mud sweeps as needed while reciprocating the drill string. The Q4000 remained in "Vessel, ROV & Tubular Downtime" status throughout the day.

The onboard scientific operations over the last 24-hours focused on processing through the onboard UT and Geotek labs the sediment, gas, and water samples labs collected from the previously acquired conventional wireline cores and the conventionalized pressure cores. Included at the end of this report are two downhole well log and core recovery displays (Figures 2 and 3) that compare the pre-expedition core plan with the actual results to date of the conventional and pressure coring program in Hole UT-GOM2-2-H003. Also shown on each of the core recovery displays are the depths where the APCT-3 was ran with the G-APC core barrel.

Based on the excellent quality of pressure core UT-GOM2-2-H003-19CS, we were able to use the PCATS acquired core scans and compare them with the downhole log data collected from Hole WR H001 in 2009. The core was collected with the top at 6870 ft RKB. After plotting the data and comparing the bulk density (downhole log) and gamma density (core scan) curves (Figure 1), we believe the most likely depth correlation with the acquired core is about ~3ft deeper at depth of 6873 ft RKB. In Figure 1, we have shifted the Blue curve down 3' relative to the depth at which it was acquired in order to illustrate this correlation. This is an encouraging result and we will continue to examine future pressure cores to see if we are "on depth" so that we can effectively core deeper key targets such as the red, blue and orange sands as defined in the project prospectus.

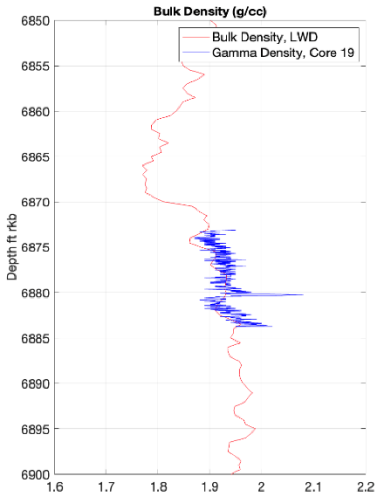

Figure 1: Downhole (LWD) bulk density log from Hole WR H001 and gamma density core scan of Core UT-GOM2-2-H003-19CS. The core data have been shifted 3 feet downwards in order to correlate the core data to the log data.

Shipboard analysis of recovered pressure cores has also included the approval of the "core cut plan" for Core UT-GOM2-2-H003-19CS, which will involve the cutting the 3.5 m long core into three nearly equal lengths and the controlled quantitative degassing of each core section to precisely determine the volume of gas evolved from each section. These analysis will again be used to further define the dissolved methane concentration profile at the site of Hole UT-GOM2-2-H003. Data on in situ methane solubility helps to define the potential distribution of gas hydrate in a marine sedimentary section. Pressure core UT-GOM2-2-H003-08CS has also been fully process through PCATS and was sub-sectioned for porewater, microbiology, and geomechanical samples in the conventional Core Receiving Lab.

We are also happy to report that no new COVID cases were reported today and that the two scientists with COVID are feeling much better.

The Scientific Party continued to work on writing both the "Methods" and "Hole H003" results chapters for the Expedition Report.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

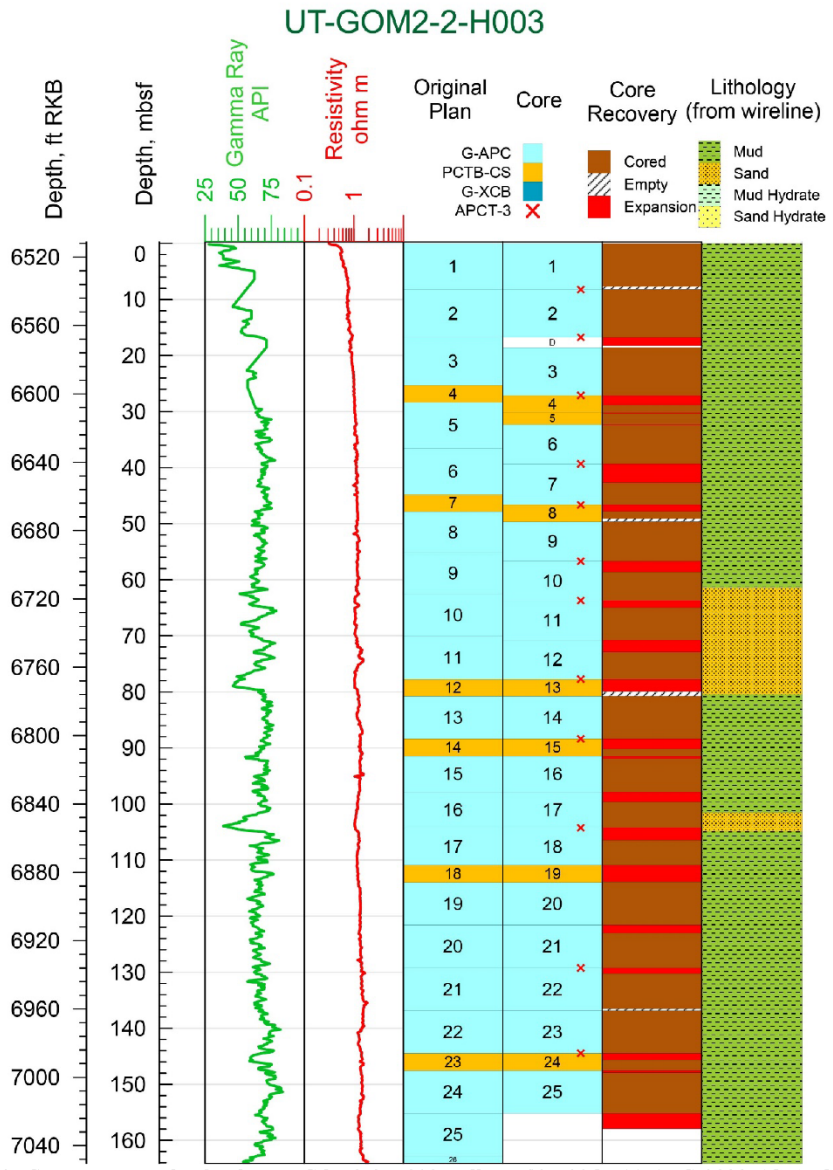

Figure 2: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 11-AUG-2023. 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool (the G-XCB core systems has not yet been deployed). 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

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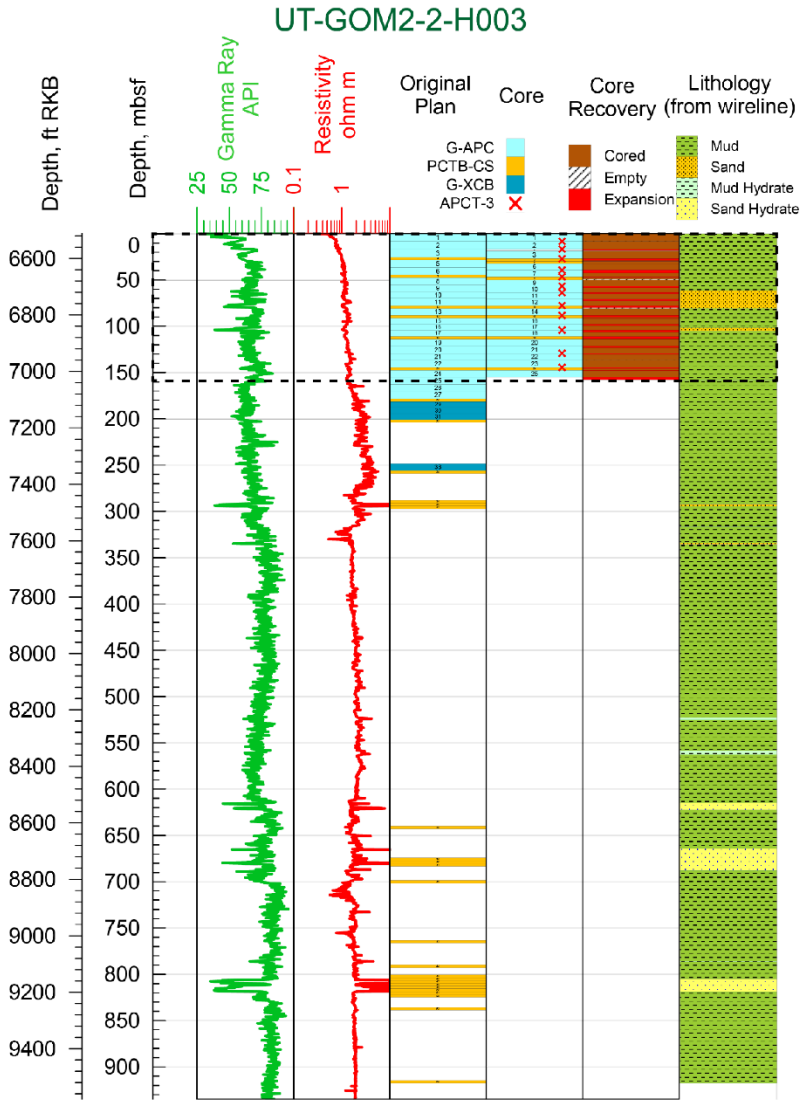

Figure 3: Planned and actual core recovery for the entire UT-GOM2-2-H003 well. 'G-APC', 'PCTB-CS', G-XCB, and 'APCT-3' are defined in the caption to Figure 2. Dashed box defines the interval cored through 24:00 hr 11-AUG-2023.

UT-GOM2-2_Daily_Science_Report_08_11_23_Final

12-August-2023, waiting on *Q4000*

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 12-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 12-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003

Last Drill/Core depth: 7015 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H003

General Maintenance: Performed corrosion maintenance in misc. areas and "weekly" maintenance on the vessel cranes. Performed 250-350 psi / 3,000 psi for 5 min test on Full-Opening Safety Valve (FOSV) using vessel mud pumps with 8.3 ppg.

0000-0130 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0130-0300 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0300-0530 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0530-0600 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0600-0930 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
0930-1000 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1000-1330 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1330-1500 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1500-1930 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1930-2100 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
2100-2400 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string

4. OPERATIONAL PLAN (Next 24 Hours):
Waiting on a replacement blower motor (cooling fan motor) for the Q4000 top drive system (TDS), while conditioning and reciprocating the drill string. Possible installation of TDS blower motor and return to coring operations.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: UT-GOM2-2-H003
G-APC Coring Totals: NA
G-XCB Coring Totals: NA

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PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: UT-GOM2-2-H003
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES
Upon inspection of the damaged Q4000 TDS blower motor (cooling fan motor) at the Houma Armature Works it was determined that the motor was more severely damaged. The new replacement blower motor, however, is expected to arrive in Houston tonight (12-AUG-23). When it clears customs, the replacement blower motor will be transported to Houma, Louisiana. We hope it will leave Sunday (13-AUG-23) morning and will be flown out by helicopter to the Q4000 (or possible transported by service boat). Installation of the new blower motor is expected to go quickly. If the blower arrives at the Q4000 on Sunday, we should be able to return to coring operations sometime in the evening 13-AUG-23.

The onboard scientific operations over the last 24-hours continued to focus on processing both conventional and conventionalized core samples previously collected in Hole GOM2-2-H003 (see Figures 1 and 2). One of the critical sample data sets being collected during the expedition includes microbiological samples that are being subsampled on the Q4000 from both conventional and conventionalized cores. Over the last 40 years, our knowledge of viable microbes in deep geological environments has become incorporated into our broader understanding of Earth's biosphere, and of deep subsurface environments that contain methane hydrates. Early studies verified both the presence of microorganisms in hydrate-bearing sediments and that much of the methane found in hydrates originates from microbial methanogenesis. However, knowledge on the distribution of microbial communities, including methanogens, proximal to methane hydrates is lacking. The compositions of microbial communities in different sediment types that exist in hydrate zones is also unknown, yet integral to our understanding of the driving factors responsible for methane hydrate formation. To address these unknowns, sub-samples are being acquired from conventional cores and conventionalized cores collected using pressure coring tools, which were depressurized onboard, and preserved at -80°C (for microbial community analysis) and 4°C (for genomics, organic matter degradation potential, potential for carbonate precipitation, assessment of the presence of single-celled Eukaryotes (Foraminifera), and enumerations of microbial cells). The -80°C stored cores will be further processed at the Geotek facilities in Salt Lake City and preserved as cryo frozen sub-cores for future microbial community characterization.

Shipboard analysis of recovered pressure cores has also continued with detailed X-ray, gamma-density, and compressional-wave scanning of the successfully recovered pressure cores in the Geotek Pressure Core Analysis and Transfer System (PCATS) along with quantitatively degassed pressure cores. Table 1 below includes details on the seven pressure-core (PCTB-CS) deployments in Hole GOM2-2-H003.

Table 1: PCTB-CS pressure core performance in Hole UT-GOM2-2-H003 through 10-AUG-2023.

CORE Top (fbsf)	CORE Bottom (fbsf)	CORE Advance (ft)	Bottom of Hole (RKB ft)	Start Coring Bit Depth (RKB ft)	CORE System	Core Number	Advanced (ft)	Curated length (ft)	Recovery (%)	In situ Pressure (psi)	Tool Boost Set Pressure (psi)	Recovery Pressure (psi)	Date/Time
89	99	10	6595	6595	PCTB-CS	4	10	10.63	106	2920	3500	0	5 Aug 0815
99	106	7	6605	6605	PCTB-CS	5	7	7.51	107	2925	3500	3475	5 Aug 1338
153	163	10	6659	6659	PCTB-CS	8	10	8.07	81	2949	3500	2075	7 Aug 1556
255	265	10	6761	6761	PCTB-CS	13	10	3.94	39	2994	3500	3531	8 Aug 1623
290	300	10	6796	6796	PCTB-CS	15	10	11.52	115	3009	3500	0	8 Aug 0148
364	374	10	6870	6870	PCTB-CS	19	10	11.35	114	3042	3500	3042	9 Aug 1527
474	484	10	6980	6980	PCTB-CS	24	10	11.35	114	3091	3500	3091	10 Aug 0816

We also need to report that we have seen the number of active COVID cases on the vessel increased with four additional members of the drilling crew being quarantined and a third member of the science party testing positive for COVID. Face masking is now required for common areas on the ship where people congregate.

The Scientific Party continued to work on organizing and writing the "Methods" section of the Expedition Report. In addition, we are working to organize our data storage from our activities and we are beginning to write up our results.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

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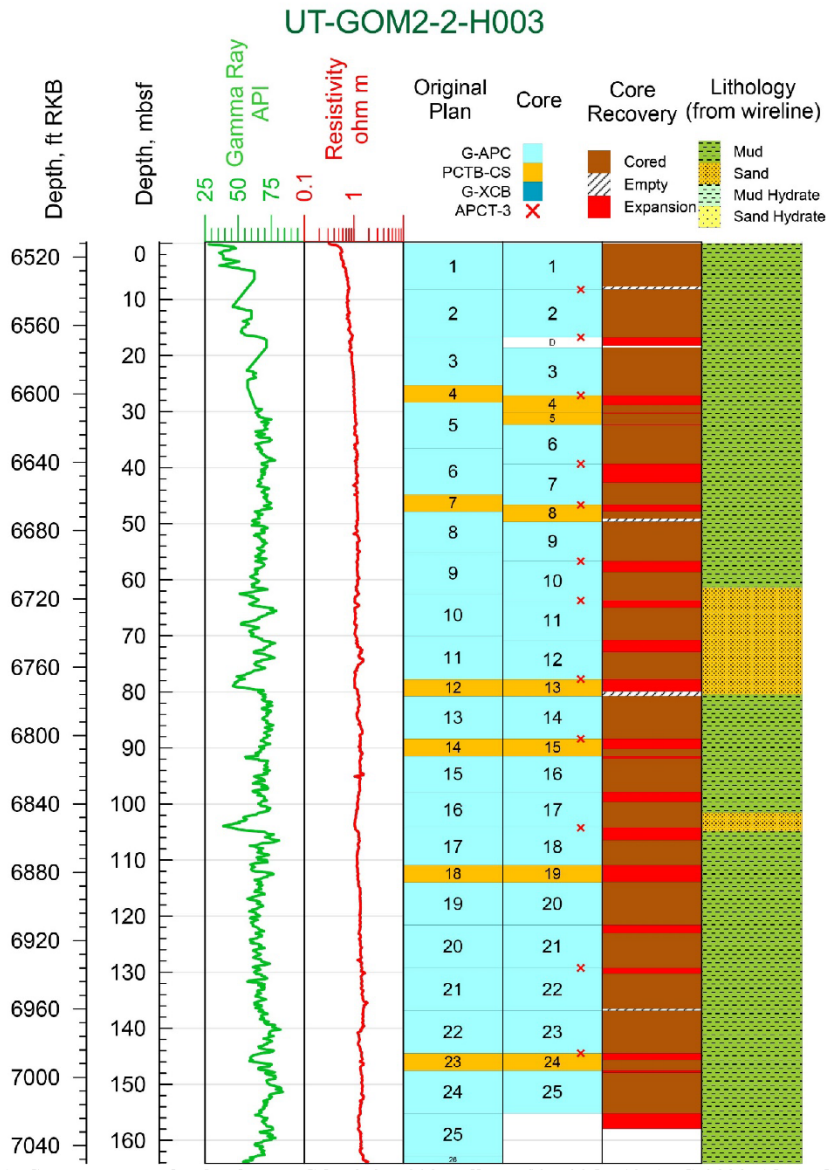

Figure 1: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 12-AUG-2023. 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool (the G-XCB core systems has not yet been deployed). 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

UT-GOM2-2_Daily_Science_Report_08_12_23_Final

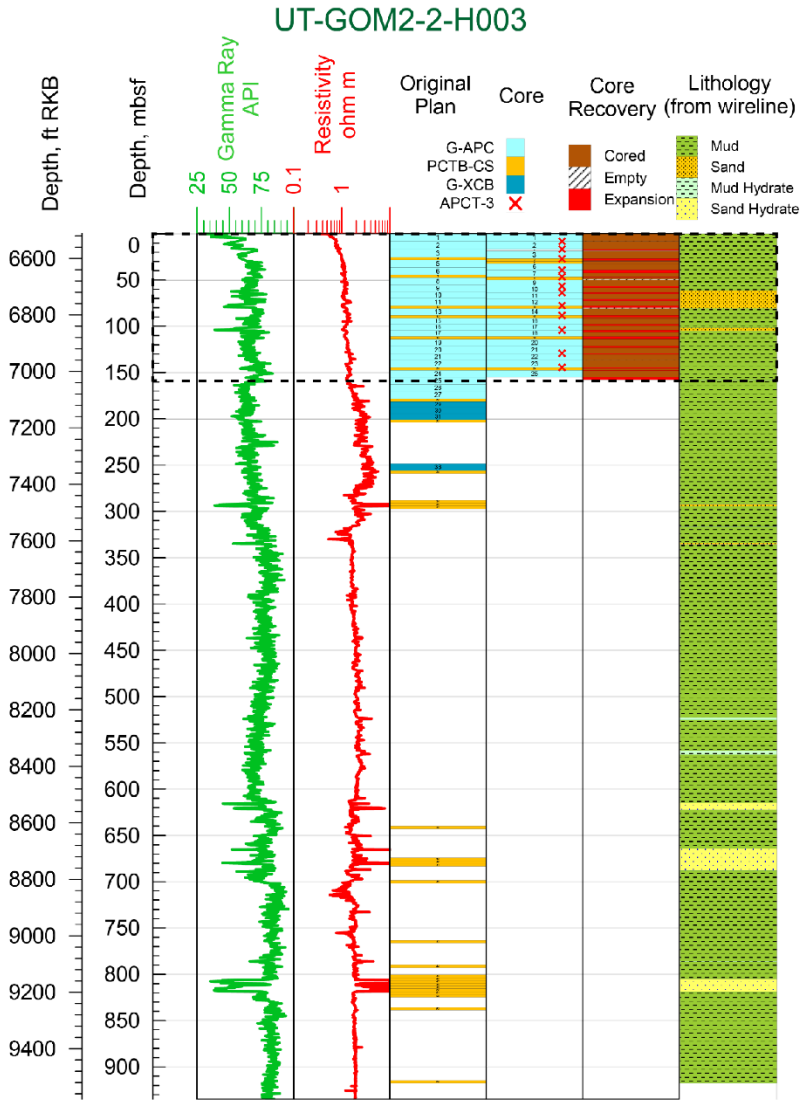

Figure 2: Planned and actual core recovery for the entire UT-GOM2-2-H003 well. 'G-APC', 'PCTB-CS', G-XCB, and 'APCT-3' are defined in the caption to Figure 2. Dashed box defines the interval cored through 24:00 hr 12-AUG-2023.

UT-GOM2-2_Daily_Science_Report_08_12_23_Final

13-August-2023, waiting on *Q4000*, Drill Ahead

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 13-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 13-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003

Last Drill/Core depth: 7015 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H003

General Maintenance: Performed corrosion maintenance in misc. areas and "weekly" maintenance on the vessel cranes.

0000-0130 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1300-0300 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0300-0730 Monitor the well while circulating 8.6 ppg SW at 87 psi while reciprocating drill string
0730-0900 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
0900-1330 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1330-1500 Pump 25 bbl 10.5 ppg Hi-Vis sweep at 75 psi while reciprocating drill string
1500-1530 Monitor the well while circulating 8.6 ppg SW at 70 psi while reciprocating drill string
1530-1845 Installing replacement blower motor in the TDS
1845-1930 Testing replacement blower motor in the TDS
1930-2015 Wash and Ream from 6992 ft RKB to 7015 ft RKB (former hole TD)
2015-2028 M/U Geotek center bit and deploy in the hole
2028-2200 Geotek center bit failed to land out in the BHA
2200-2225 Geotek M/U wireline to CBRT tool then lower into drill pipe
2225-2314 RIH w/CBRT to top of the center bit while pumping 5 bpm at 101 psi
2314-2400 Latch into center bit and continue to RIH

4. OPERATIONAL PLAN (Next 24 Hours):
Advance the hole by drilling from 509.0 fbsf to 914.0 fbsf. Conduct wireline directional survey. Acquire one G-XCB core and three additional PCTB-CS pressure cores in Hole UT-GOM2-2-H003 with the following planned core runs:
Core UT-GOM2-2-H003-26X, 914.0 to 942.0 fbsf
Core UT-GOM2-2-H003-27CS, 942.0 to 952.0 fbsf
Core UT-GOM2-2-H003-28CS, 952.0 to 962.0 fbsf
Core UT-GOM2-2-H003-29CS, 962.0 to 972.0 fbsf

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5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals: NA

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The Q4000 replacement TDS blower motor arrived in Houston this morning and was loaded to an hotshot delivery. The replacement blower motor arrived at the Bristow Houma Heliport 1300 hr and was flow out to the Vessel by helicopter, arriving on the rig around 1530 hr. Helix expedited the installation of the new blower motor in the TDS, which was operational and tested by 1930 hr.

After consultation with the onboard scientists and Geotech, it was decided to advance the hole from its current depth of 7015 ft RKB (509.0 fbsf) by drilling (without coring) to a core point depth of 7420 ft RKB (914.0 fbsf) to just above the Red Sand, where one G-XCB core and three PCTB-CS pressure cores will be acquired. The Red sand will be cored to examine methane migration mechanisms and gas hydrate formation in fine-grained marine sediments that also contain coarse-grained gas hydrate-bearing sedimentary units. In intervals dominated by fine-grained sediments, with coarse-grained layers, gas hydrate is found disseminated in the pore space. Hydrate can form from microbial methane that is believed to have diffused from adjacent fine-grained sediments as in short-range migration, which will be tested with the cores targeting the Red Sands.

In support of the ongoing microbiological research program being conducted on the Q4000, pressure cores are being cryo frozen in liquid nitrogen within a Geotek core processing device that allows pressure cores while still under controlled pressure conditions to be frozen. This system involves immersing and cryo-freezing a pressure core subsample in liquid nitrogen while still under pressure before releasing the pressure for longer term storage and transportation once the sample has been frozen. This development has allowed many more pristine gas hydrate-bearing samples to be shipped to different laboratories worldwide for special analysis. On this expedition, liquid nitrogen frozen cryo cores have been collected for specialized post-expedition microbiological subsampling and analysis (Figure 1).

Figure 1: PCTB-CS pressure core sample from Hole UT-GOM2-2-H003 being converted to a liquid nitrogen frozen microbiological cryo core, which will be stored in an -80°C freezer on the Q4000.

We have 4 members of the ship crew with COVID and 4 members of the UT crew with COVID. All are deemed to be stable and recuperating while isolated. We hope that two of our science colleagues will be able to return to work this coming Wednesday.

The Scientific Party continued to work on organizing and writing the "Methods" section of the Expedition Report and processing samples and data that has been collected during the expedition.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

UT-GOM2-2_Daily_Science_Report_08_13_23_Final_Rev2

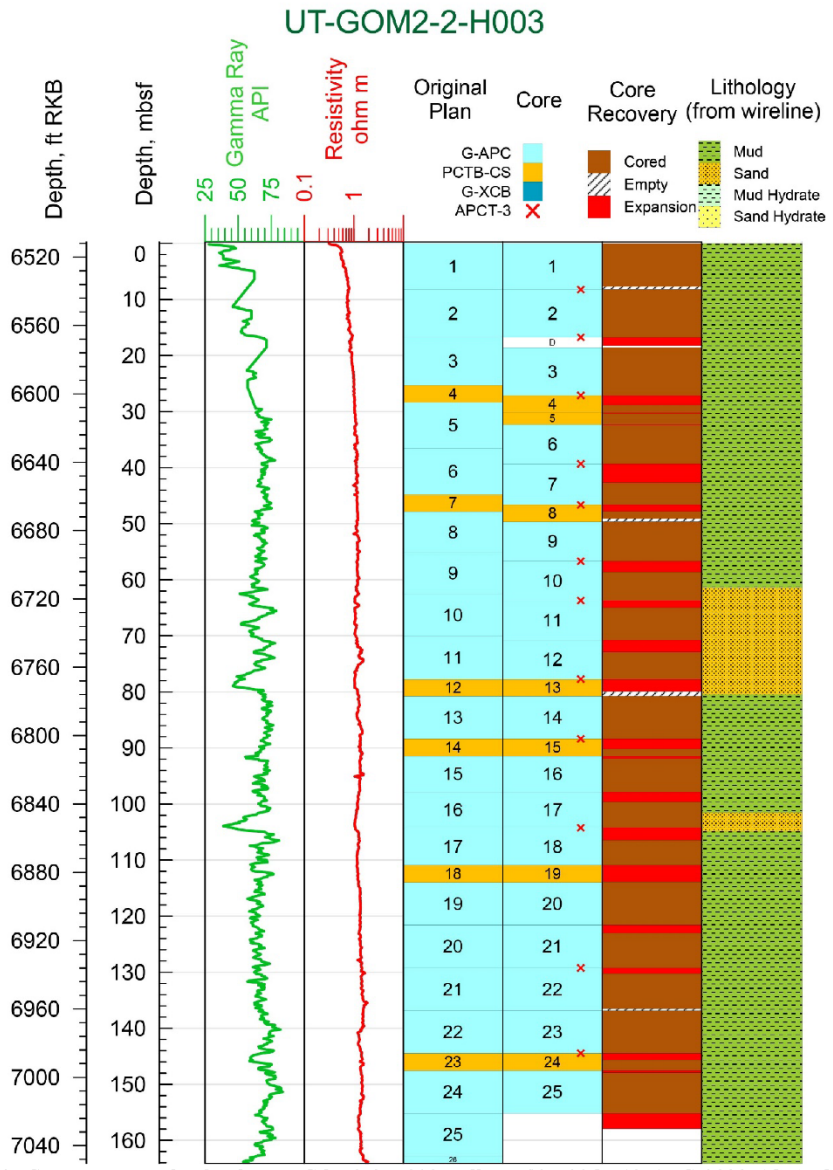

Figure 2: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 12-AUG-2023. 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool (the G-XCB core systems has not yet been deployed). 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB).

UT-GOM2-2_Daily_Science_Report_08_13_23_Final_Rev2

'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

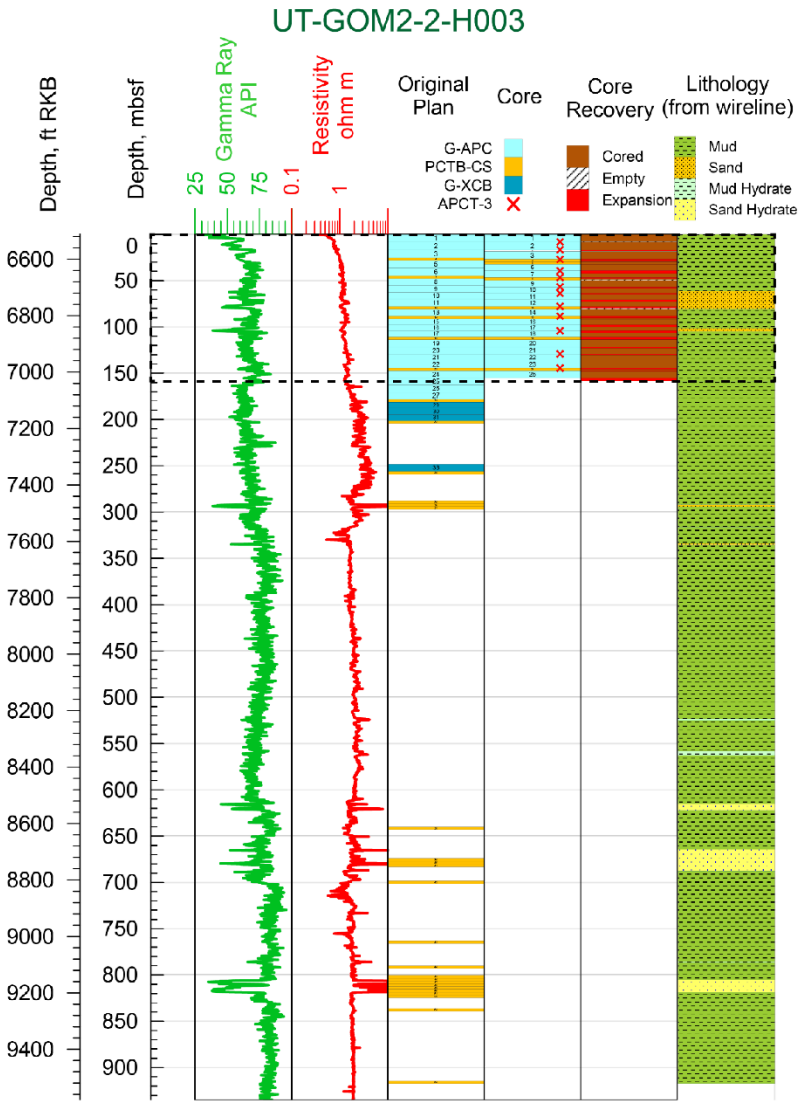

Figure 3: Planned and actual core recovery for the entire UT-GOM2-2-H003 well. 'G-APC', 'PCTB-CS', G-XCB, and 'APCT-3' are defined in the caption to Figure 2. Dashed box defines the interval cored through 24:00 hr 12-AUG-2023.

UT-GOM2-2_Daily_Science_Report_08_13_23_Final_Rev2

14-August-2023, Cores H003-26X to H003-28CS

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 14-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 14-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003

Last Drill/Core depth: 7458 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H003

General Maintenance: *Helix D/V Q4000* ROV corrosion maintenance, general rig housekeeping.

0000-0930	Drill ahead from 7015 to 7420 ft RKB at 70 RPM w/ 3-4k torque, pumping at 7 bpm and a pressure of 830 psi while maintaining 2-5k on bit and 100 ROP; pumped 40 bbl of 10.5 ppg Hi-Vis sweep.
0930-1258	Recover Geotek Center Bit (CBRT) used to advance the hole by drilling.
1258-1400	Prepare to run **Core UT-GOM2-2-H003-26X**, space out G-XCB and RIH.
1400-1530	RIH G-XCB from surface to 7420 ft RKB while pumping with 8.6 ppg seawater at 3.5 bpm and 150 psi using the cement pumps; and latch G-XCB into BHA; recovery running tool to the ship.
1530-1600	Acquire G-XCM rotary **Core UT-GOM2-2-H003-26X** from F/ 7420 to T/ 7448 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg SW at 3.5 bpm and 330 psi.
1600-1800	RIH the Geotek CBRT to recover the G-XCM inner barrel to the vessel.
1800-2030	Prepare to run **Core UT-GOM2-2-H003-27CS**, RIH the PCTB, and recover wireline running tool.
2030-2100	Acquire PCTB-CS rotary **Core UT-GOM2-2-H003-27CS** from F/ 7448 - T/ 7458 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi.
2100-2147	RIH the Geotek CBRT to recover the PCTB-CS tool, POOH **Core UT-GOM2-2-H003-27CS.**
2147-2400	Prepare to acquire **Core UT-GOM2-2-H003-28CS.**

4. OPERATIONAL PLAN (Next 24 Hours):
Advance the hole by coring and drilling from 952.0 fbsf to 2100.0 fbsf. Conduct two wireline directional surveys. Acquire two additional PCTB-CS pressure cores in Hole UT-GOM2-2-H003 with the following planned core runs:
Core UT-GOM2-2-H003-28CS, 952.0 to 962.0 fbsf
Core UT-GOM2-2-H003-29CS, 962.0 to 972.0 fbsf

UT-GOM2-2_Daily_Science_Report_08_14_23_Final

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals: NA

G-XCB Coring Totals:

Core UT-GOM2-2-H003-26X: 27.92 ft recovered core (100% recovery)

PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-27CS: *NA* ft (*NA* % recovery), 3550 psi – *core currently in PCATS Coring F/ 7448 - T/ 7458 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi.*

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

As reviewed in the 13-AUG-23 Daily Operational and Science Report for the UT-GOM2-2 Coring Expedition, it was decided to advance Hole UT-GOM2-2-H003 by drilling (without coring) to a core point depth of 7420 ft RKB (914.0 fbsf) to just above the Red Sand. The hole was successfully drilled without any problems to the targeted depth of 7420 ft RKB by 0930 hr on 14-AUG-23. The first G-XCB core (**Core UT-GOM2-2-H003-26X**) of the UT-GOM2-2 Expedition was acquired over the core depth interval from 914.0 to 942.0 fbsf, with a total recovery of 27.92 ft of core (100 % recovery). The G-XCB also known as the Geotek "Extended Core Barrel" or "Rotary Extended Shoe Coring System" is designed to acquire cores in relatively more lithified sedimentary formations. In this case, the **Core UT-GOM2-2-H003-26X** yield almost a continuous core section characterized by several large (up to ~10 inches long) gas-charged voids in the recovered core liner. Much like similar gas voids commonly observed in G-APC cores, as described in earlier UT-GOM2-2 Coring Expedition reports, the gas voids were sampled by using a specialized tool to pierce the Butyrate liner and collect gas samples in several different containers that will be processed post-expedition to further characterize the processes controlling the formation of gas hydrates in marine sediments. The other data critical to these analyses were collected in **Core UT-GOM2-2-H003-27CS**, which was a pressure core collected immediately after the **Core UT-GOM2-2-H003-26X** G-XCB core. The pressure core in this case will yield important information on the occurrence of gas hydrate in the targeted Red Sand and additional information on the solubility of methane within the pore fluids associated with the occurrence of gas hydrate in this stratigraphic section.

There has been no new COVID cases on the *Q4000* in the last 48 hours; we are also happy to report that 2 of the 4 UT scientists were released from isolation on the afternoon of 14-AUG-23. There are 3 members of the ship crew and 2 members of the UT crew that are still in quarantine; all are being closely monitored and are recuperating.

The Scientific Party ais working on finalizing the "Methods" section of the Expedition Report and processing samples and data that has been collected during the expedition.

UT-GOM2-2_Daily_Science_Report_08_14_23_Final

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

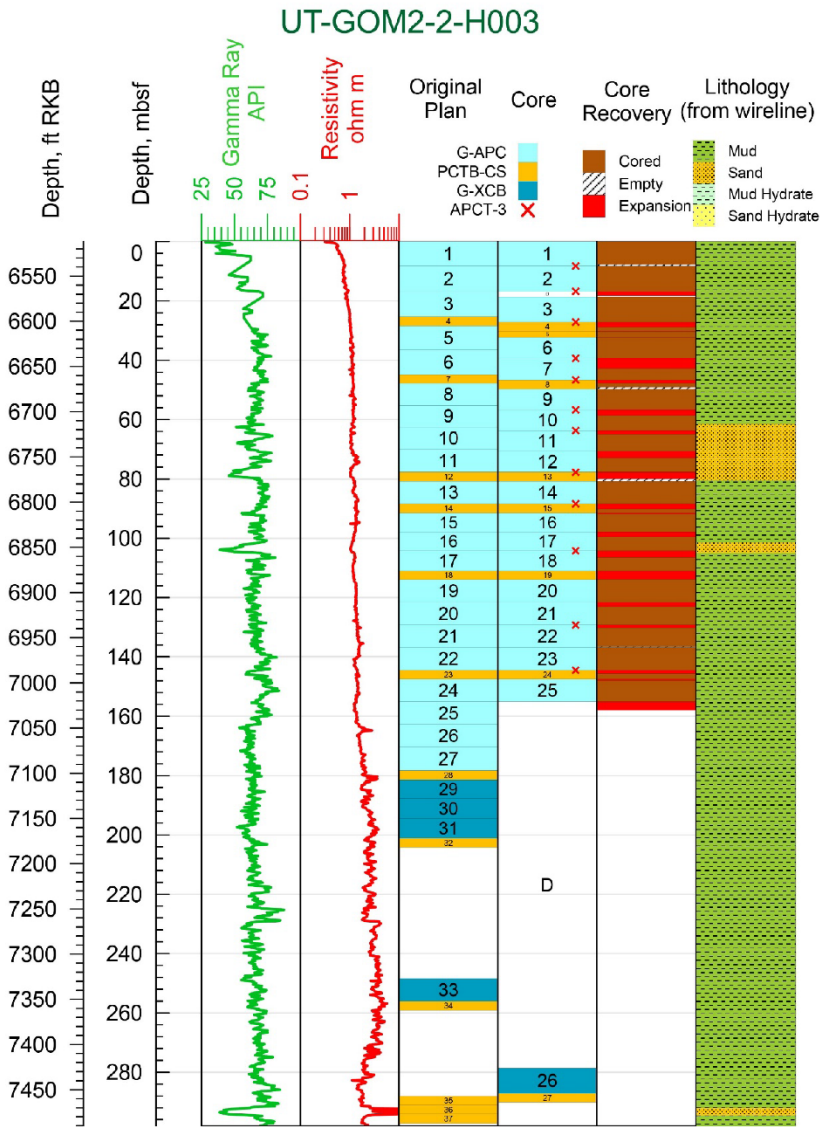

Figure 1: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 14-AUG-2023. 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool. 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

UT-GOM2-2_Daily_Science_Report_08_14_23_Final

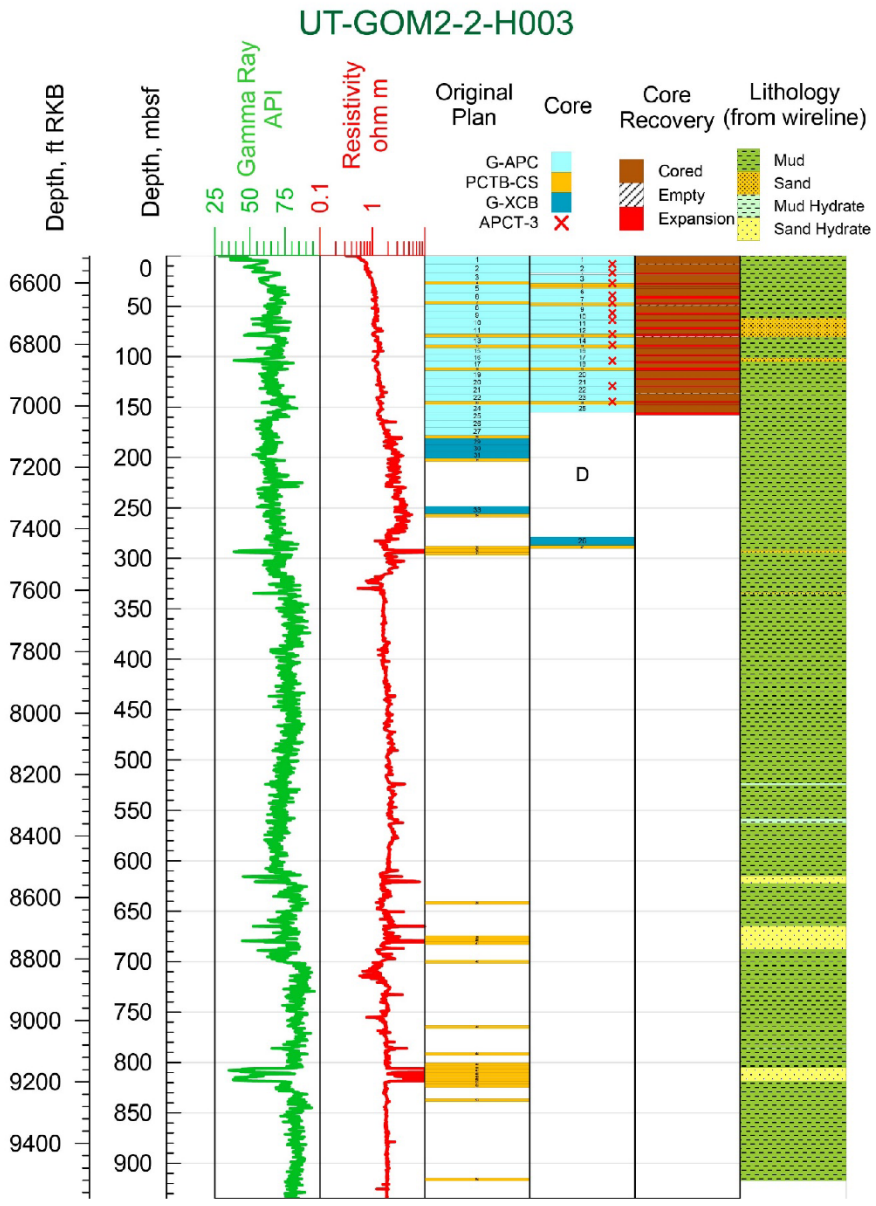

Figure 2: Planned and actual core recovery for the entire UT-GOM2-2-H003 well. 'G-APC', 'PCTB-CS', G-XCB, and 'APCT-3' are defined in the caption to Figure 1. Dashed box defines the interval cored through 24:00 hr 14-AUG-2023.

UT-GOM2-2_Daily_Science_Report_08_14_23_Final

Figure 3: The 'air blower' arrives by helicopter.

Figure 4: Steve Phillips gets his first breath of fresh air after a 5 day quarantine.

UT-GOM2-2_Daily_Science_Report_08_14_23_Final

15-August-2023, Core H003-29CS, H003 gyro survey, H003 P&A

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 15-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 15-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003

Last Drill/Core depth: 7505 ft RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'46.50488"N, Long 091°40'33.82464"W

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H003

General Maintenance: General rig housekeeping. Fluid management during pumping operations.

0000-0100 Continue to POOH the PCTB, observed damage to the SLB slick line (S/L) wire.
0100-0330 Remove damaged wire from S/L, slip and cut 200 ft of S/L wire, rebuilt pack off.
0330-0430 Deploy PCTB retrieval tool and RIH, latch tool into BHA.
0430-0500 Acquire PCTB-CS rotary **Core UT-GOM2-2-H003-28CS** from F 7460 - T/ 7470 ft (RKB) at 60 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi.
0500-0620 RIH the Geotek CBRT to recover the PCTB-CS tool, POOH **Core UT-GOM2-2-H003-28CS.**
0620-0900 Prepare to run **Core UT-GOM2-2-H003-29CS**, RIH the PCTB, and recover wireline running tool.
0900-0930 Acquire PCTB-CS rotary **Core UT-GOM2-2-H003-29CS** from F 7470 - T/ 7480 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 4.0 bpm and 400 psi.
0930-1025 RIH the Geotek CBRT to recover the PCTB-CS tool, POOH **Core UT-GOM2-2-H003-29CS.**
1025-1130 RIH Geotek Center Bit while pumping 4 bpm at 305 psi, latch into BHA.
1130-1200 Drill ahead from 7480 to 7485 ft RKB at 70 RPM, w/ 3-4k torque, pumping at 8 bpm, and a pressure of 1000 psi while maintaining 2-5k on bit and a ROP of 100 per minute.
1200-1300 Drill ahead from 7485 to 7505 ft RKB at 70 RPM, w/ 3-4k torque, pumping at 7 bpm, and a pressure of 803 psi while maintaining 2-5k on bit and a ROP of 100 per minute.
1300-1330 Pumped 40 bbls of 10.5 ppg Hi-Vis sweep to prepare hole for logging operations.
1330-1630 RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 6600 and 7500 ft RKB.
1630-2000 Pumped 8.6 ppg seawater at 7 bpm with 818 psi while rotating and reciprocating the drill pipe from 7450 to 7505 ft RKB.

UT-GOM2-2_Daily_Science_Report_08_15_23_Final

1947	Received verbal approval on 15-Aug-23 at 1947 hours to proceed with proposed abandonment of **Hole UT-GOM2-2-H003** from Mr. Bill Sanders BSEE Houma District.
2000	Decision to terminate operations in **Hole UT-GOM2-2-H003.**
2000-2130	Displaced hole by pumping 115 bbls of 11.0 ppg WBM (P&A MUD) with Hex pump #1 at 7 bpm with 464 psi followed by 110 bbls of 8.6 ppg seawater.
2130-2400	POOH Geotek PTCB cutting shoe BHA from 7505 to 6491 ft RKB.

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to pull out of Hole UT-GOM2-2-H003, laydown drill pipe in doubles and bottom hole coring assembly. Prepare to move to the location of the permitted **Hole UT-GOM2-2-H002** and prepare the PCTB-FB coring tool for deployment.

5. DOWNHOLE LOGGING OPERATIONS:

Hole: UT-GOM2-2-H003

Wireline Totals (directional): After advancing the hole to a depth of 7505 ft RKB (999 fbsf), conducted wireline deployed (memory sonde) gyroscopic surveys at two depths with a Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 6600 and 7500 ft RKB. After completing the surveys, POOH and laid out gyroscopic tool and accessed the tool memory, the recorded survey data at a depth of 7505 ft RKB (999 fbsf) indicated a borehole inclination of 7.765° degrees at a azimuth of 124.38°. The same survey at the mud line (seafloor) indicated an inclination of 6.06° degrees at a azimuth of 123.32°. Note that BSEE considers any borehole with an inclination of the more the 3° to be a deviated well, which requires additional approvals and the acquisition of more regular directional surveys with depth (every 500 ft).

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-27CS: *11.05* ft (*92* % recovery), 3531 psi; As deployed on 14-Aug-23 (updated information).

Coring F/ 7448 - T/ 7458 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi.

Core UT-GOM2-2-H003-28CS: *NA* ft (*NA* % recovery), 3550 psi (waiting to be processed in PCATS).

Coring F/ 7460 - T/ 7470 ft (RKB) at 60 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi.

Core UT-GOM2-2-H003-29CS: *NA* ft (*NA* % recovery), 3550 psi (waiting to be processed in PCATS).

Coring F/ 7470 - T/ 7480 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 4.0 bpm and 400 psi.

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: UT-GOM2-2-H003

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Today's coring operations in **Hole UT-GOM2-2-H003** featured the acquisition of two additional pressure cores that targeted the "Red Sand", with the first of the three PCTB-CS cores **(Core UT-GOM2-2-H003-27CS)** being collected the day before on 14-AUG-23. **Core UT-GOM2-2-H003-28CS** was acquired from a depth of F/ 7460 - T/ 7470 ft (RKB) (954-964 fbsf). The third core in this set of three PCTB-CS deployments that targeted the "Red Sand" was the **Core UT-GOM2-2-H003-29CS.** Again, this set of three PCTB-CS and the overlying **Core UT-GOM2-2-H003-26X** conventional G-XCB core were deployed to obtain additional information on the solubility of methane within the pore fluids associated with the occurrence of gas hydrate in the cored stratigraphic section and examine the formation of gas hydrate within mud-rich stratigraphic sections that also contain coarse sand layers with high gas hydrate saturations.

The significant deviation from vertical of the **UT-GOM2-2-H003** borehole (borehole inclination of 7.765° at 7505 ft RKB), as reviewed in the "Downhole Logging Operations" section of this report, places our ability to target the deeper coring targets at significant risk. The cause of the measured hole deviation is unknown; however, it is possible that the strong currents that were present when the hole was originally spudded resulted in an offset of the drilling vessel position relative to the spudded position of the borehole at the seafloor. The offset could have led to the establishment of an inclined borehole at spud and the observed deviated well at depth. It is important to highlight that coring the gas hydrate-bearing sands associated with the deeper Orange Interval is the most important science goal of the expedition, and it is highly doubtful that that we would have successfully cored these critical targets from the current position of the **UT-GOM2-2-H003** borehole.

There have been no new COVID cases on the *Q4000* in the last 72 hours; we are again happy to report that the 3rd member of the UT science party has been released from isolation on the afternoon of 14-AUG-23. There are 3 members of the ship crew and 1 person from the UT crew that are still in quarantine; all are being closely monitored and are recuperating.

The Scientific Party is working on finalizing the "Methods" section of the Expedition Report and processing samples and data that has been collected during the expedition. The UT Science Party also convened a project review science meeting at midnight on 15-AUG-23.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

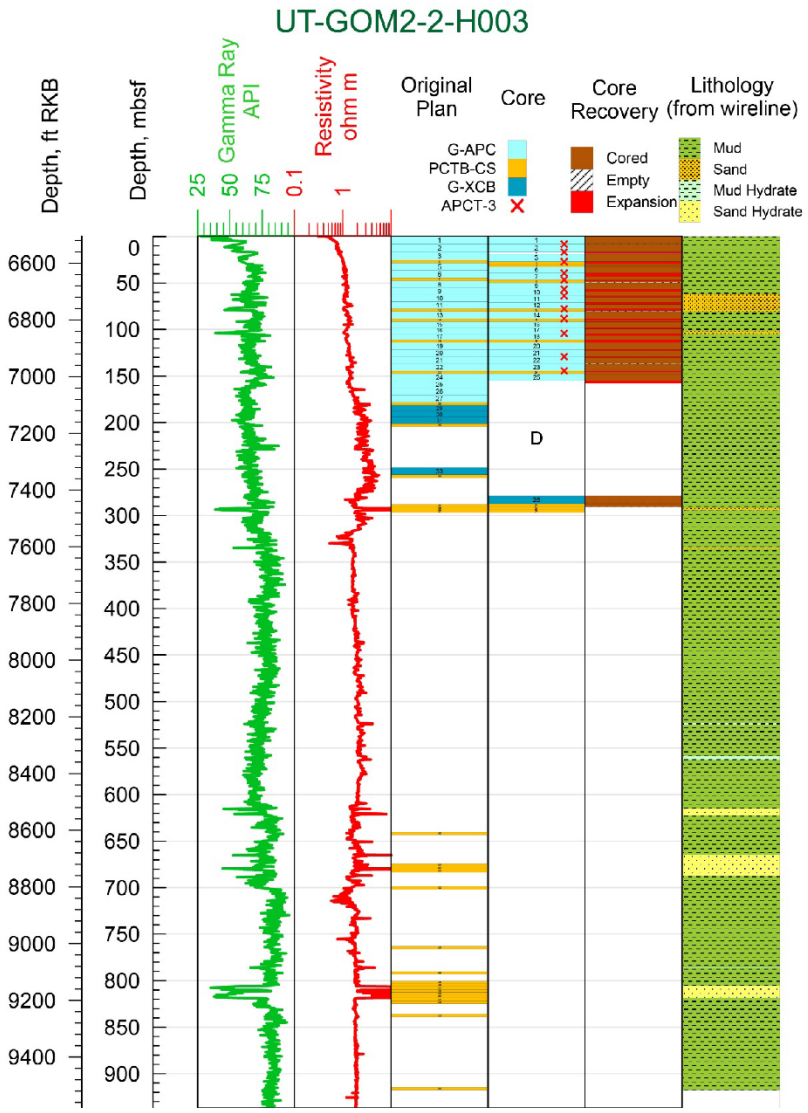

Figure 1: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 15-AUG-2023. 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool. 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

UT-GOM2-2_Daily_Science_Report_08_15_23_Final

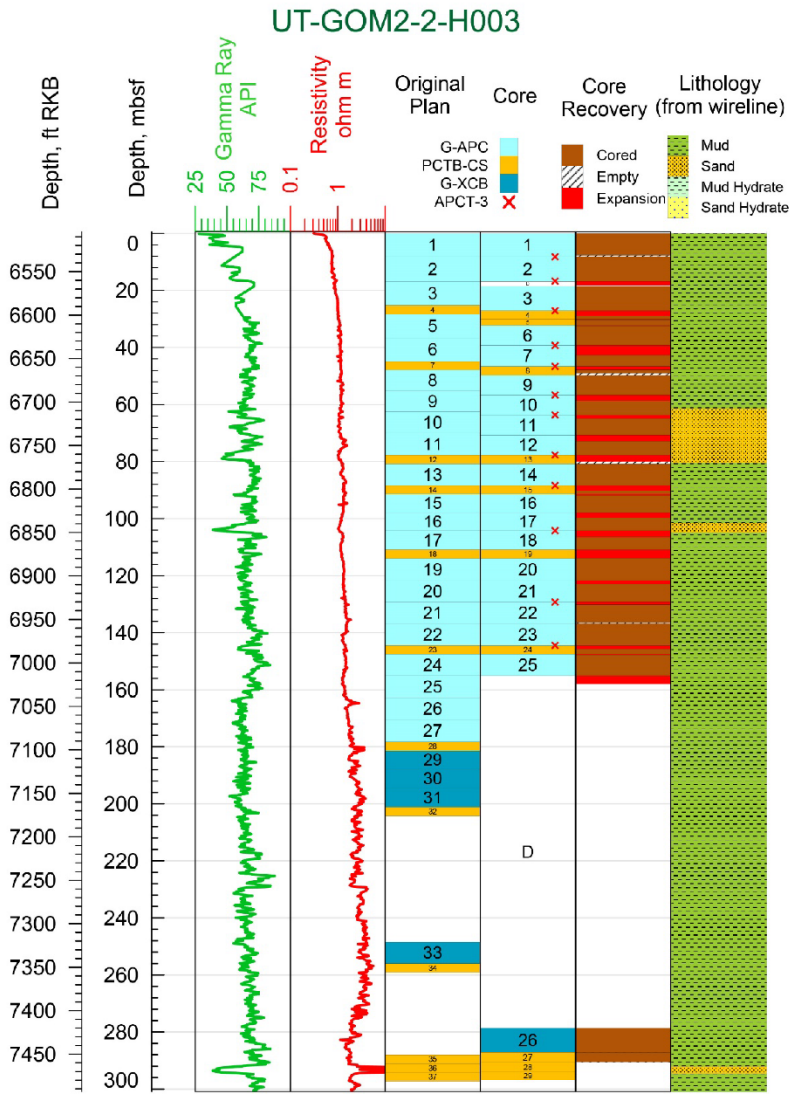

Figure 2: Planned and actual core recovery for the entire UT-GOM2-2-II003 well. 'G-APC', 'PCTB-CS', G-XCB, and 'APCT-3' are defined in the caption to Figure 1. Dashed box defines the interval cored through 24:00 hr 15-AUG-2023.

Figure 3: Science meeting.

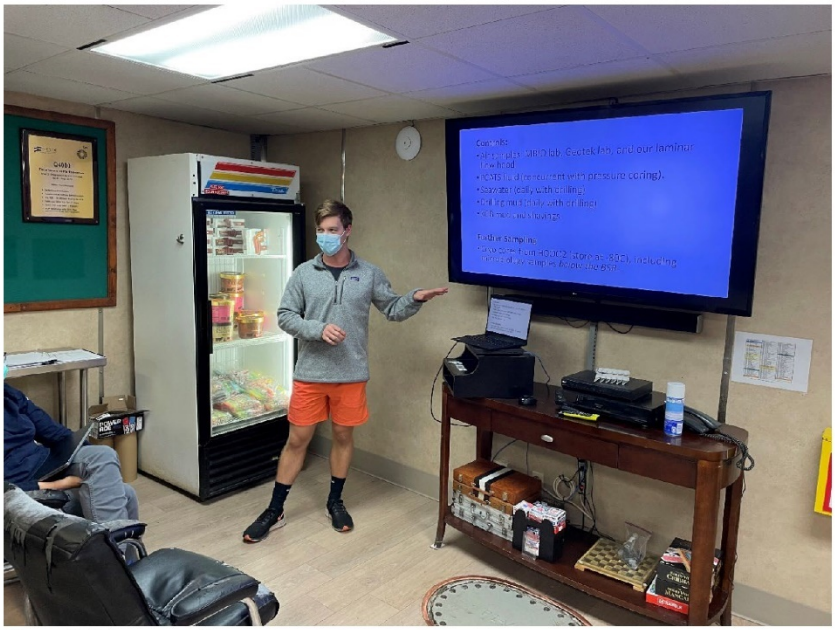

Figure 4: Science meeting.

UT-GOM2-2_Daily_Science_Report_08_15_23_Final

16-August-2023, Move to H002

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 16-August-2023, 0000-2400hr

2. LOCATION:

0000-0900 hr, 16-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H003
Last Drill/Core depth: 7505 ft RKB
RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft (updated 05-AUG-2023)
Per Datum: 52 ft
Lat 26°39'45.4451"N, Long 091°40'33.5852"W NAD27 BLM15 Feet (updated 16-AUG-2023)

0900-2400 hr, 16-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002
Last Drill/Core depth: NA
RKB to Mud line: NA ft on Drill pipe measurements
Water depth: NA
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-0900 At Hole UT-GOM2-2-H003

0000-0030	M/U to TDS POOH F/ 6491 to T/ 6455 ft RKB, flush drill sting with 200 bbls of seawater at 8 bpm and 1100 psi.
0030-0900	POOH F/ 6455 to T/ 203 ft RKB while laying down doubles of 5 7/8" XT57 drill pipe.
0900	End of Hole UT WR313 H003 and start of Hole UT WR313 H002.

0900-2400 At Hole UT-GOM2-2-H002

The University of Texas at Austin submitted Rig Move Notification to move from WR313 H003 to WR H002 on 16-AUG-23 to BSEE Houma District.

0900-1000	M/U 9-7/8 inch PCTB Face Bit pressure coring tool (PCTB-FB) Bottom Hole Assemblage (BHA).
1000-1030	Install Geotek Center Bit Assembly into the PCTB-FB BHA seal bore assembly and confirm space out.
1030-2100	RIH BHA with 8.5 inch drill collar and 9-7/8 inch stabilizers to 6454 ft RKB making up doubles of 5 7/8" XT57 drill pipe, torquing to 52k ft/lbs. Drifted drill string w/ 4.125 inch drift.
2100-2400	MU TDS and pump-in sub and install testing equipment. Conducting pressure test of the drilling system internal lower blowout preventers (IBOPs) on the TDS.

4. OPERATIONAL PLAN (Next 24 Hours):
Spud Hole UT-GOM2-2-H002 and drill to the first PCTB-FB core point at 2100 ft RKB.

UT-GOM2-2_Daily_Science_Report_08_16_23_Final

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: UT-GOM2-2-H003

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals:

Core UT-GOM2-2-H003-28CS: *2.46* ft (*25* % recovery), 3478 psi. *(updated 17-AUG-23) Coring F/ 7460 - T/ 7470 ft (RKB) at 60 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 3.5 bpm and 330 psi. (updated information)*

Core UT-GOM2-2-H003-29CS: *8.6* ft (*86* % recovery), 3480 psi. *(updated 17-AUG-23) Coring F/ 7470 - T/ 7480 ft (RKB) at 80 rpm, maintaining 8-10k on bit, CMT pumping 8.6 ppg seawater at 4.0 bpm and 400 psi. (updated information)*

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

As reviewed in the 15-AUG-23 Daily Operational and Science Report for the UT-GOM2-2 Coring Expedition, after confirming the significant deviation from vertical of the **UT-GOM2-2-H003** borehole (borehole inclination of 7.765° at 7505 ft RKB), the decision was made at 2000 hr on 15-AUG-23 to terminate operations in **Hole UT-GOM2-2-H003** and move over and drill/core **Hole UT-GOM2-2-H002. Hole UT-GOM2-2-H003** was completed to a total depth of 7505 ft RKB (999 fbsf), with the deployment of 18 G-APCs, 1 G-XCB, and 10 PCTB-CS pressure cores (Figure 1, Table 1). The PCATS scans of **Core UT-GOM2-2-H003-27CS** (Figure 2) revealed evidence of fracture filling gas hydrate.

Operations at the location of **Hole UT-GOM2-2-H002 began at** 0900 on 16-AUG-2023 with the preparation of running into the open ocean the PCTB Face Bit pressure coring tool (PCTB-FB) Bottom Hole Assemblage (BHA).

There has been no new COVID cases on the *Q4000* in the last four days. There is one person from the UT crew that is still in quarantine, they are expected to be released tomorrow.

The Scientific Party is working on finalizing the "Methods" section of the Expedition Report and processing samples and data that has been collected during the expedition. The UT Science Party also convened a project review science meeting at midnight on 16-AUG-23 to review the ongoing pressure core sampling program.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch

UT-GOM2-2_Daily_Science_Report_08_16_23_Final

RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

Table 1: PCTB-CS pressure core performance in Hole UT-GOM2-2-H003 through 16-AUG-2023 (End of Hole).

CORE System	Core Number	Bottom of Hole (RKB ft)	Start Coring Bit Depth (RKB ft)	CORE Top (fbsf)	CORE Bottom (fbsf)	CORE Advance (ft)	Curated length (ft)	Recovery (%)	In situ Pressure (psi)	Tool Boost Set Pressure (psi)	Recovery Pressure (psi)	Date	Time, Core on Deck
PCTB-CS	4	6595	6595	89	99	10	10.63	106%	2920	3500	0	5-Aug	8:15
PCTB-CS	5	6605	6605	99	106	7	7.51	107%	2925	3500	3475	5-Aug	13:38
PCTB-CS	8	6659	6659	153	163	10	8.07	81%	2949	3500	2075	7-Aug	15:56
PCTB-CS	13	6761	6761	255	265	10	3.94	39%	2994	3500	3531	8-Aug	16:23
PCTB-CS	15	6796	6796	290	300	10	11.52	115%	3009	3500	0	9-Aug	1:48
PCTB-CS	19	6870	6870	364	374	10	11.35	114%	3042	3500	3042	9-Aug	15:27
PCTB-CS	24	6980	6980	474	484	10	11.35	114%	3091	3500	3091	10-Aug	8:16
PCTB-CS	27	7448	7448	942	954	12	11.06	92%	3299	3500	3531	14-Aug	21:50
PCTB-CS	28	7460	7460	954	964	10	2.46	25%	3304	3500	3478	15-Aug	6:33
PCTB-CS	29	7470	7470	964	974	10	8.60	86%	3309	3500	3480	15-Aug	9:31

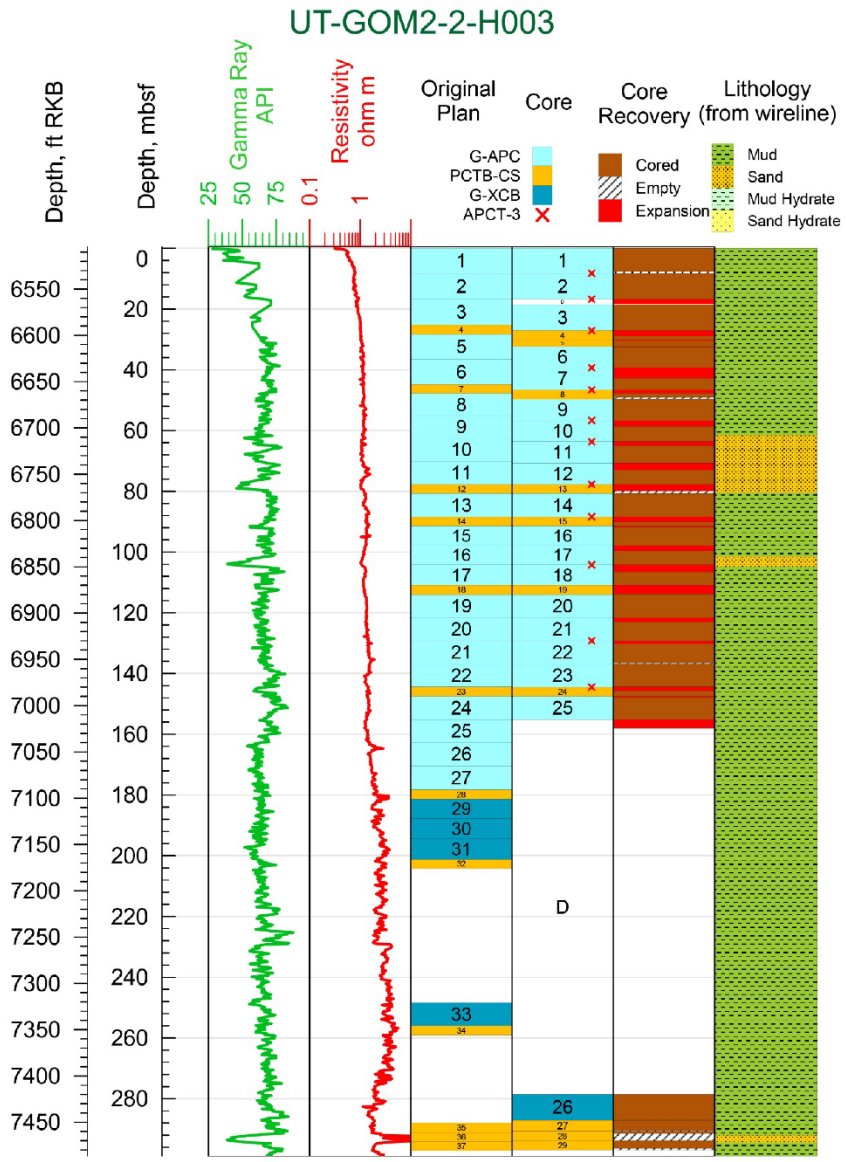

Figure 1: Core recovery plot for the UT-GOM2-2-H003 well as of 09:00 hr 16-AUG-2023 (End of Well). 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool. 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

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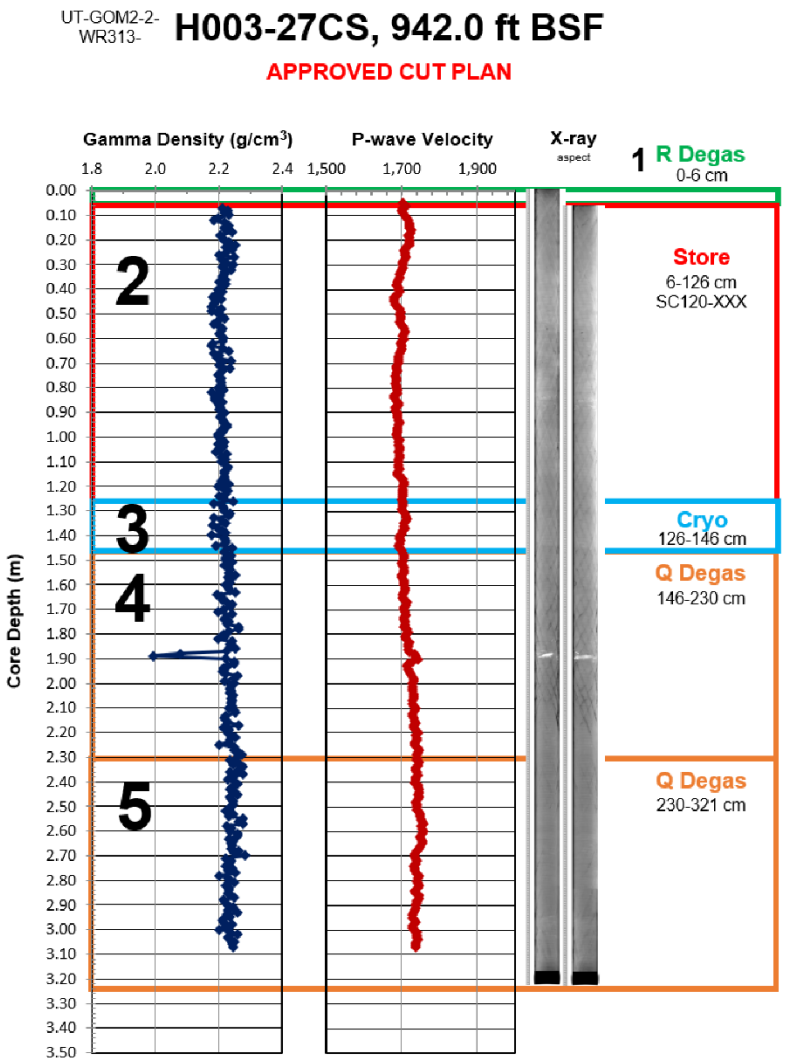

Figure 2: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H003-27CS from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images reveal evidence of fracture filling gas hydrate at a depth of 1.90 m in the core

UT-GOM2-2_Daily_Science_Report_08_16_23_Final

image. This core was cut under pressure into 5 sections for quantitative degassing, cryogenic freezing in liquid nitrogen, long-term storage, or rapid degassing.

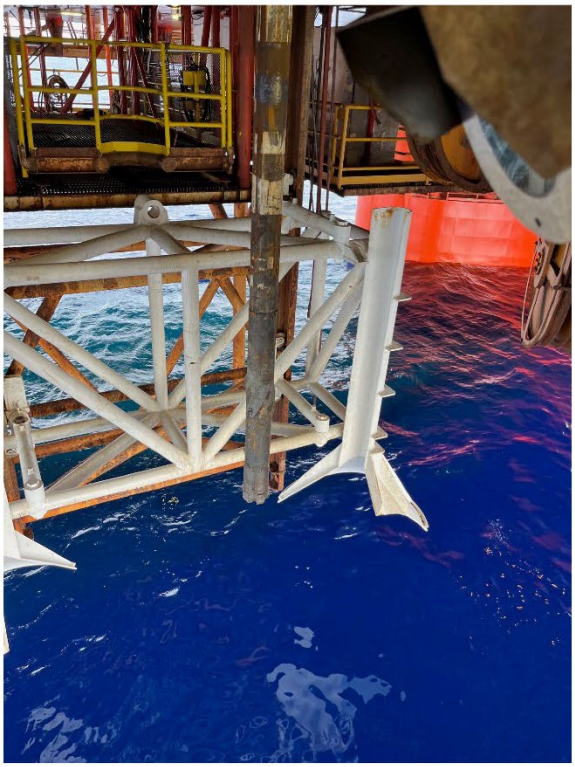

Figure 3: Recovery in the Moon Pool of the Q4000 D/V of the PCTB Cutting Shoe pressure coring tool (PCTB-CS) after the completion of ***Hole UT-GOM2-2-H003.***

Figure 4: UT Scientists witnessing the recovery of the PCTB Cutting Shoe pressure coring tool (PCTB-CS) after the completion of ***Hole UT-GOM2-2-H003.***

UT-GOM2-2_Daily_Science_Report_08_16_23_Final

17-August-2023, Spud H002, Gyro surveys

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 17-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 17-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 6924 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: Held pit drill with drill crew. General rig housekeeping. Fluid management during pumping operations.

0000-0500 Continued pressure testing of the drilling system internal lower blowout preventers (IBOPs) on the TDS. Test Night Cap and Kelly Hose assemblies. Test cement assembly offline.
0500-0600 Move drilling vessel 35 m at an azimuth of 191° to the selected spud position.
0600-0800 Spud **Hole UT-GOM2-2-H002**, verified mudline (seafloor) depth by ROV observation of drill bit tag at 6506 ft RKB. Drilled ahead at 150 GPM, 18 RPM, w/ 90 psi, and 0 k WOB, F/ 6506 to 6570 ft RKB. Pumped 15 bbls of 10.5 ppg Hi-Vis sweeps as directed.
0800-1000 Prepare for initial directional survey in **Hole UT-GOM2-2-H002**, RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 6506 ft RKB (0 fbsf). POOH the gyro survey tool.
1000-1100 Circulated and condition hole while downhole gyro log data was acquired. Gyro inclination survey reading of 0.24°.
1100-1600 Drilled ahead at 200 GPM, 25 RPM, w/ 90 psi, 0 k WOB, F/ 6570 to 6720 ft RKB. Pumped 15 bbls of 10.5 ppg Hi-Vis sweeps as directed.
1600-1730 Prepare for second directional survey in **Hole UT-GOM2-2-H002**, RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 6667 ft RKB (161 fbsf). POOH the gyro survey tool.
1730-1830 Circulated and conditioned hole while downhole gyro log data was acquired. Gyro inclination survey reading of 0.82° at 110° azimuth. Vessel was moved 14 m at 110° to correct for the measured deviation.
1830-2400 Drilled ahead at 275 GPM, 35 RPM, w/ 92 psi, 0-2 k WOB, F/ 6720 to 6924 ft RKB. Pumped 15 bbls of 10.5 ppg Hi-Vis sweeps as directed.

4. OPERATIONAL PLAN (Next 24 Hours):

Continue to drill ahead to the first PCTB-FB core point at 8606 ft RKB (2100 fbsf). Conduct planned gyro survey at 7715 ft RKB (1209 fbsf). Switch over to the continuous use of drilling mud (10.5 ppg mud) at 8100 ft RKB (1594 fbsf).

5. DOWNHOLE LOGGING OPERATIONS:

Hole: Hole UT-GOM2-2-H002

Wireline Totals (directional): Because of the well deviation problem experienced in **Hole UT-GOM2-2-H003**, the drilling of the "top hole" section in the **Hole UT-GOM2-2-H002** included two relatively shallow borehole deviation surveys (inside of drill pipe), one at 6506 ft RKB (0 fbsf) and the second at 6715 ft RKB (209 fbsf); and an additional deviation survey yet to be conducted in the same hole at 7715 ft RKB (1209 fbsf). The wireline deployed (memory sonde) gyroscopic logging services on the Q4000 are being provided by Gyro-Data, who used an Omega – 1.875 inch Battery Slickline Gyro and performed the directional surveys in both **Holes UT-GOM2-2-H002 and -H003**. After completing each of the surveys in **Hole UT-GOM2-2-H002** and accessing the tool memory, it was determined that for the recorded survey at a depth of 6506 ft RKB (0 fbsf) the borehole was inclined at 0.24° and for the survey at 6715 ft RKB (209 fbsf) the borehole was inclined at 0.82° at an azimuth of 110°. Both of these initial surveys show that **Hole UT-GOM2-2-H002** is well within the BSEE inclination limit of 3.0° for a deviated well classification.

6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Hole UT-GOM2-2-H002 was spudded at 0600 hr on 17-AUG-23 at a ROV observed "bit-tag" mudline (seafloor) depth of 6506 ft RKB. **Hole UT-GOM2-2-H002** was than advanced throughout the remainder of the day to a depth of 6924 ft RKB (418 fbsf). Before the spudding of **Hole UT-GOM2-2-H002** the Q4000 rig crew had to complete an extensive set of permit required testing of the drilling system internal lower blowout preventers (lBOPs) on the TDS, the rig Night Cap, and the Kelly Hose assemblies.

Because of the well deviation concerns associated with the previously drilled/cored **Hole UT-GOM2-2-H003**, the spud in program and initial "top-hole" drilling phase of **Hole UT-GOM2-2-H002** featured the use of controlled drilling parameters designed to reduce borehole deviations, such as limiting weight on bit and the use of higher mud pump rates that allows the borehole to "drop more straight" with depth (Figure 1). Also as reviewed above in the "Downhole Logging Operations" section of this report, two shallow directional surveys were conducted in **Hole UT-GOM2-2-H002** at a depth of 6506 ft RKB (0 fbsf) and the second at 6715 ft RKB (209 fbsf), which yielded measured borehole inclinations of 0.24° and 0.82° @ 110° azimuth , respectively.

The Science Party quantitatively degassed two core sections from Core H003-27CS that was previously acquired in **Hole UT-GOM2-2-H003**, which were then processed as conventionalized core. Two sections

from H003-29CS (also acquired in **Hole UT-GOM2-2-H003)** were quantitatively degassed. Gas samples were collected from each of the degassed sections. The degassing results indicate the presence of low-saturation methane hydrate in each of these sections. Liquid-nitrogen frozen microbiology samples (i.e., cryo cores) were collected from Cores H003-27CS and H003-29CS.

There have been no new COVID cases on the *Q4000* in the last five days and the last UT crew member was released from quarantine.

The Scientific Party is working on finalizing the "Methods" and "Results" section of the Expedition Report and processing samples and data that has been collected during the expedition.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

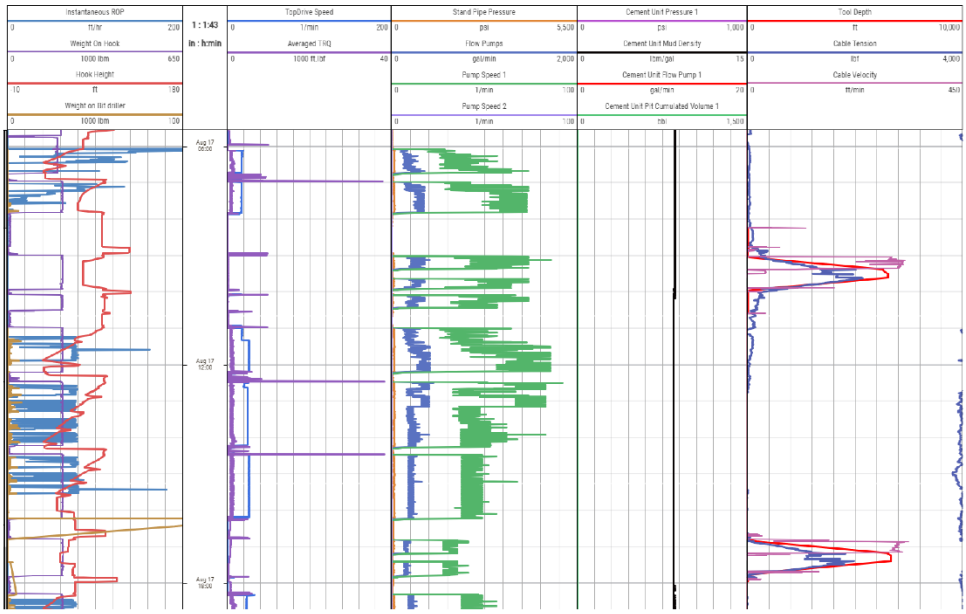

Figure 1. Display of the drilling parameters used to advance the top-hole section of ***Hole UT-GOM2-2-H002****. The most important drilling log data depicted in this image includes the Instantaneous Rate of Penetration (ROP), Weight on Bit (WOB), Top Drive Speed (RPM), Average Torque (TRQ), Stand Pipe Pressure (SPP), Rig Pump Volumes (RPV), Cement Pump Volumes (CPV), and Hook Height (HH). The spudding of the well at 0600 hr on 17-Aug-2023 can be seen on the ROP, TRQ, and RPM drilling logs (top of display). Each 60 ft drill pipe (each drill pipe stand of 60 ft) advance can also be seen with decreasing Hook Height (HH – red log) and on the ROP, TRQ, and rig/cement pump volume logs. Of particular interest are the logs of the two wireline surveys (Cable Tool Depth, Cable Tension, and Cable Velocity logs) that collected the borehole deviation surveys at* 6506 ft RKB (0800 hr) and the second at 6715 ft RKB (1700 hr).

18-August-2023, Drill ahead, Gyro survey

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 18-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 18-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 7583 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General rig housekeeping. Paint spots on deck with first primer coat. Offload and backload supply connex from *M/V Harvey Hermes*.

0000-0700 Continued to drill ahead at 330 GPM, 50 RPM, w/ 150 psi, 0-2 k WOB, F/ 6924 to 7299 ft RKB. Pumped 10.5 ppg Hi-Vis sweeps as directed.
0700-0830 Service Topdrive, Block Equipment, and TDS Dolly Roller.
0830-1200 Continued to drill ahead at 330 GPM, 60 RPM, w/ 230 psi, 0-5 k WOB, F/ 7299 to 7489 ft RKB. Pumped 8.6 ppg Hi-Vis sweeps as directed.
1200-1830 Continued to drill ahead at 350 GPM, 70 RPM, w/ 300 psi, 0-5 k WOB, F/ 7489 to 7720 ft RKB. Pumped 8.6 ppg Hi-Vis sweeps as directed.
1830-2130 Prepare for third directional survey in **Hole UT-GOM2-2-H002**, RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 7667 ft RKB (1161 fbsf). POOH the gyro survey tool. Gyro inclination survey reading of 0.35°.
2130-2400 Continued to drill ahead at 350 GPM, 70 RPM, w/ 330 psi, 0-5 k WOB, F/ 7720 to 7853 ft RKB. Pumped 8.6 ppg Hi-Vis sweeps as directed.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue to drill ahead to the first PCTB-FB core point at 8606 ft RKB (2100 fbsf). Switch over to the continuous use of drilling mud at ~8100 ft RKB (~1594 fbsf).

5. DOWNHOLE LOGGING OPERATIONS:
Hole: Hole UT-GOM2-2-H002
Wireline Totals (directional): The wireline deployed (memory sonde) gyroscopic logging services on the Q4000 are being provided by Gyro-Data, who used an Omega – 1.875 inch Battery Slickline Gyro to perform the directional surveys in **Hole UT-GOM2-2-H002** at a depth of 7667 ft RKB (1161 fbsf). It was determined that for the recorded survey at a depth of 7667 ft RKB (1161 fbsf) the borehole was inclined at 0.35° at an azimuth of 96.79°. This survey is again within the BSEE inclination limit of 3.0° for a deviated well classification.

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6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Over the last 24 hours, **Hole UT-GOM2-2-H002** was advanced by drilling from a depth of 6924 to 7853 ft RKB (with a total drilled interval of 929 ft) without any significant problems. Because of the well deviation concerns associated with the previously drilled/cored **Hole UT-GOM2-2-H003**, the drilling program in the "top-hole" section of **Hole UT-GOM2-2-H002** was executed using controlled drilling parameters, which also limited the rate of bit penetration within the upper section of the well to about 30 to 60 ft per hour. After conducting a borehole direction survey at 7667 ft RKB (1161 fbsf) and determining that the borehole was very near vertical with and inclination 0.35° (with an azimuth of 96.79°), it was determined that it was now safe to increase the borehole drilling rate. By increasing the weight on bit (WOB) to ~5000 lbs, and increasing drilling fluid pump rates ~350 GPM, and similarly increasing the drill bit RPMs to over ~70, we experienced a drilling rate increase to as high as 120 ft per hour. We hope to reach the core point for the first PCTB-FB in **Hole UT-GOM2-2-H003** around 1600 hr on 19-AUG-23.

The Science Party completed the processing of all of the remining PCTB-CS pressures cores that were acquired from **Hole UT-GOM2-2-H003** with the final conventionalization of two sections from Core H003-29CS (Figures 1 and 2) and the standard acquisition of microbiological (MBIO), pore-water (PW), and headspace gas samples (HS); along with vane-shear (VANE) and pocket penetrometer (PEN) measurements. The position along the cores for two additional physical property samples were also identified for future processing at the post-expedition shore-based laboratories to be established in Salt Lake City, Utah.

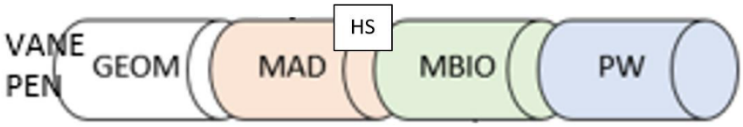

Figure 1. Display of acquired whole round core samples and associated core measurements as obtained from conventionalized PCTB-CS cores in *Hole UT-GOM2-2-H003 (see text for further explanation).*

There have been no new COVID cases on the *Q4000* in the last six days.

The Scientific Party is working on finalizing the "Methods" and "Results" section of the Expedition Report and processing samples and data that has been collected during the expedition.

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9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

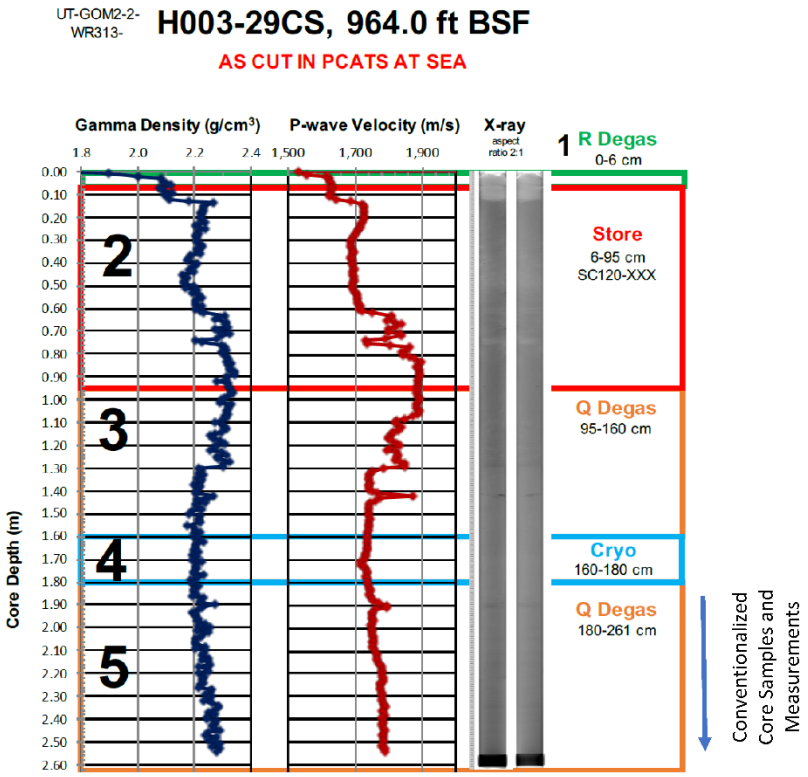

Figure 2: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H003-29CS from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images and "as cut core in PCATS and position of conventionalized core samples and measurements.

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19-August-2023, Drill ahead, Transition to Water-Based Mud

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 19-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 19-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 8621 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General rig housekeeping. Offload and backload supply connex from *M/V Harvey Hermes*. Changing out mechanical seal on brine charge pump #1.

0000-0450 Continued to drill ahead while pumping at 330 GPM, w/ 150 psi, 70 RPM, 0-5 k WOB, F/ 7583 to 8100 ft RKB. Pumped 10.5 ppg Hi-Vis sweeps as directed.
0450-0455 Continued to drill ahead while pumping at 300 GPM, w/ 202 psi, 70 RPM, 0-5 k WOB, F/ 8100 ft RKB. **Swapped borehole over to 9.0 ppg water based mud (WBM).**
0455-1200 Continued to drill ahead while pumping 10.3 ppg WBM at 300 GPM, w/ 202 psi, 70 RPM, 0-10 k WOB, F/ 8100 to 8272 ft RKB.
1200-2000 Continued to drill ahead while pumping 10.3 ppg WBM at 300 GPM, w/ 90 psi, 70 RPM, 0-5 k WOB, F/ 8272 to 8621 ft RKB.
2000-2215 R/U and RIH Geotek Center Bit retrieval tool and POOH Center Bit.
2215-2315 Prepare and RIH the PCTB-FB coring tool.
2315-2400 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.

4. OPERATIONAL PLAN (Next 24 Hours):
Acquire the first core in **Hole UT-GOM2-2-H002** from 8621 to 8631 RKB (2115-2125 fbsf), which will be **Core UT-GOM2-2-H002-01FB.** Next, conduct a wireline directional survey with BHA at 8626 ft RKB (bit 5 ft off bottom). Then advance hole by drilling from 8631 to 8718 ft RKB (2073-2160 fbsf) (87 ft hole advance). Acquire three consecutive PCTB-FB pressure cores in Hole UT-GOM2-2-H002 at a depth from 8718 to 8748 ft RKB:

Core UT-GOM2-2-H003-01FB, 2115.0 to 2125.0 fbsf
Core UT-GOM2-2-H003-02FB, 2212.0 to 2222.0 fbsf
Core UT-GOM2-2-H003-03FB, 2222.0 to 2232.0 fbsf
Core UT-GOM2-2-H003-04FB, 2232.0 to 2242.0 fbsf

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Activity	Ft RKB	fbsf
H002-01-Start	8621	2115
H002-01 End	8631	2125
Drill Ahead Start	8631	2125
Drill Ahead End	8718	2212
H002-02 Start	8718	2212
H002-02 End	8728	2222
H002-03 Start	8728	2222
H002-03 End	8738	2232
H002-04 Start	8738	2232
H002-04 End	8748	2242

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: NA

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals: NA

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Over the last 24 hours, **Hole UT-GOM2-2-H002** was advanced by drilling from a depth of 7583 to 8621 ft RKB (for a total drilled interval of 1038 ft) without any significant problems. Continued to drill ahead to the first PCTB-FB core point at 8621 ft RKB (2115 fbsf) and prepared to acquire **Core UT-GOM2-2-H003-01FB.** The plan forward for coring in **Hole UT-GOM2-2-H002** calls for acquiring six cores associated with the Blue Sand and background mud, nine cores associated with the Orange Sand and its bounding intervals, and two cores selected to staddle the base of the gas hydrate stability zone as inferred by a prominent seismic imaged bottom simulation reflector (BSR) that crosses the path of **Hole UT-GOM2-2-H002.**

At a depth of ~8100 ft RKB (~1594 fbsf) the drilling fluids program in **Hole UT-GOM2-2-H002** was slowly switched over to the continuous use of water-based weighted drilling mud. Mud was mixed on the fly to the active pit and a mud weight of ~10.5 ppg mud, while drilling ahead from ~8100 ft RKB and pumping 10.5 ppg mud at ~300-350 gpm, ~60-70 RPM, ~3-5k WOB, and a maximum ROP of 100 ft/hr. The WR313 H001 well at this location was drilled without incident with 10.5 ppg mud back in 2009 under the Joint Industry Project Leg II. As reviewed above for **Hole WR313 H002**, it will be drilled with 10.5 ppg mud below about ~1600 fbsf to allow for better hole cleaning, increased hole stability, and to counterbalance any overpressure from gas or water that may be present.

The bottom hole assembly (BHA) being used to recover pressure cores in **Hole UT-GOM2-2-H002** is referred to as the face bit BHA. The BHA provides weight and stiffness for drilling as well as a means for landing and latching the coring tools. Various subs for landing and latching the coring tools and attaching the coring bits are also included in the BHA. The cutting shoe and face bit BHAs have flapper valves to prevent back flow into the drill string when a coring tool or center bit is not in place. The Pressure Coring Tool with Ball Valve (PCTB-FB) in the face bit configuration is used to recover pressurized core samples. Once landed and latched in the BHA the borehole can be advanced up to 10 feet (3 m) while capturing the core. Upon recovery of the PCTB-FB, the ball valve is closed and the pressure chamber is sealed. The PCTB-FB is then recovered with the core maintained at near in situ pressure.

There have been no new COVID cases on the *Q4000* in the last seven days.

The Scientific Party is working on finalizing the "Methods" section and working on the "Results" sections of the Expedition Report and processing samples and data that has been collected during the expedition.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

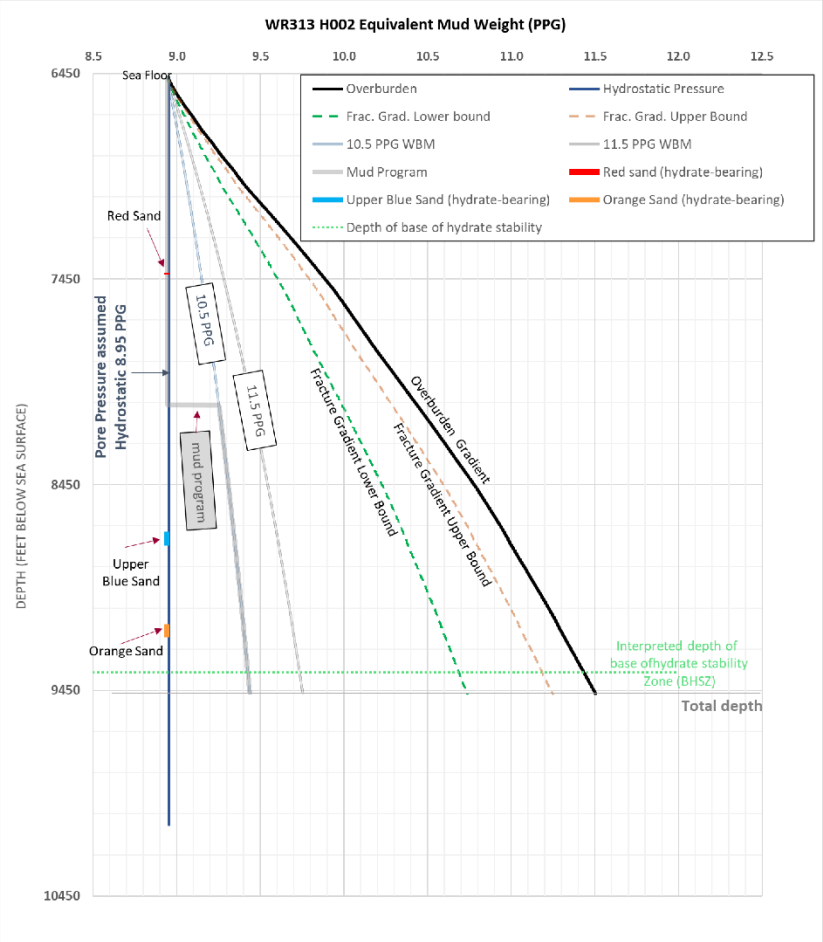

Figure 1. Equivalent mud weight plot for ***Hole UT-GOM2-2-H002****.*

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20-August-2023, Cores H002-01FB to H002-03FB

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 20-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 20-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 8738 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General rig housekeeping. Offload/backload supplies and continue to transfer drilling mud from *M/V Harvey Hermes*. Held shallow gas drill with crew.

0000-0030 Continue to RIH PCTB retrieval tool.
0030-0100 Acquire **Core UT-GOM2-2-H003-01FB**, F/8621 - T/8631 ft RKB (2115.0 to 2125.0 fbsf.)
0100-0210 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
0210-0830 Prepare and RIH Geotek Center Bit (required several attempts to land out Center Bit).
0830-1000 Prepare for fourth directional survey in **Hole UT-GOM2-2-H002**, RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at 8577 ft RKB (2071 fbsf). POOH the gyro survey tool. Gyro inclination survey reading of 0.60° at an azimuth of 99.31°.
1000-1300 Drilled ahead while pumping 10.3 ppg mud, at 7 bpm, w/ 93 psi, 70 RPM, 0-10 k WOB, F/ 8631 to 8718 ft RKB.
1300-1500 R/U and RIH Geotek Center Bit retrieval tool and POOH Center Bit.
1500-1700 Observed with the ROV partial loss of returns from the wellhead to the seafloor, possibly caused by borehole carvings, pumped 30 bbls of Hi Vis sweep to clear the borehole.
1700-1830 Prepare and RIH the PCTB-FB coring tool.
1830-1930 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1930-2000 Acquire **Core UT-GOM2-2-H003-02FB**, F/8718 - T/8728 ft RKB (2212.0-2222.0 fbsf).
2000-2115 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
2115-2130 Prepare and RIH the PCTB-FB coring tool.
2130-2330 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
2330-2400 Acquire **Core UT-GOM2-2-H003-03FB**, F/8728 - T/8738 ft RKB (2222.0-2232.0 fbsf).

4. OPERATIONAL PLAN (Next 24 Hours):
Acquire the third consecutive PCTB-FB pressure core in **Hole UT-GOM2-2-H002** at a depth from 8738 to 8748 ft RKB **Core UT-GOM2-2-H003-04FB** (2232.0 to 2242.0 fbsf). We will next advance

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the hole by drilling from 8748 to 9010 ft RKB and prepare to acquire **Core UT-GOM2-2-H003-05FB** (2504.0 to 2514.0 fbsf).

Blue Sand (and background mud) Coring Campaign

Activity	Ft RKB	fbsf	Completed
H002-01FB-Start	8621	2115	X
H002-01FB End	8631	2125	X
Drill Ahead Start	8631	2125	X
Drill Ahead End	8718	2212	X
H002-02FB Start	8718	2212	X
H002-02FB End	8728	2222	X
H002-03FB Start	8728	2222	X
H002-03FB End	8738	2232	X
H002-04FB Start	8738	2232	
H002-04FB End	8748	2242	

5. DOWNHOLE LOGGING OPERATIONS:

Hole: Hole UT-GOM2-2-H002

Wireline Totals (directional): The wireline deployed (memory sonde) gyroscopic logging services on the Q4000 are being provided by Gyro-Data, who used an Omega – 1.875 inch Battery Slickline Gyro to perform the directional surveys in **Hole UT-GOM2-2-H002** at a depth of 8577 ft RKB (2071 fbsf) at which depth the borehole was determined to inclined at 0.60° and at an azimuth of 99.31°. This survey is within the BSEE inclination limit of 3.0° for a deviated well classification.

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals: NA

PCTB-FB Coring Totals:

Core UT-GOM2-2-H003-01FB: *3.31* ft (*33* % recovery), 0 psi.
Coring F/ 8621 - T/ 8631 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.5 bpm and 155 psi.

Core UT-GOM2-2-H003-02FB: *4.39* ft (44% recovery), 4543 psi.
Coring F/ 8718 - T/ 8728 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.5 bpm and 155 psi.

Core UT-GOM2-2-H003-03FB: *NA* ft (*NA* % recovery), 4542 psi. *(being processed in PCATS)*
Coring F/ 8728 - T/ 8738 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.5 bpm and 155 psi.

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

From 0030 to 0100 hr on the morning of 20-AUG the first PCTB-FB core (**Core UT-GOM2-2-H003-01FB**) was attempted in **Hole UT-GOM2-2-H002** within the depth interval from 8621 to 8631 ft RKB (2115.0 to 2125.0 fbsf). Upon recovery of **Core UT-GOM2-2-H003-01FB** it was confirmed that the lower ball valve seal on the PCTB-FB had properly sealed, however, the upper seal on the autoclave failed to fully engage; thus, **Core UT-GOM2-2-H003-01FB** was recovered without pressure.

As reviewed above in the "Downhole Logging Operations" section of this report, an additional regulatory required directional survey was conducted in **Hole UT-GOM2-2-H002** immediately following the acquisition of **Core UT-GOM2-2-H003-01FB.** The directional survey conducted at a depth of 8577 ft RKB (2071 fbsf) in in **Hole UT-GOM2-2-H002** indicated a borehole inclination of 0.60° with an azimuth of 99.31°.

The hole was then advanced by drilling from 8631 to 8718 ft RKB (2125-2212 fbsf) (87 ft hole advance), at 8718 ft RKB our attention turned to the acquisition of three consecutive PCTB-FB pressure cores across the main reservoir section of the Blue Sands in **Hole UT-GOM2-2-H002** at a depth from 8718 to 8748 ft RKB (2212-2242 fbsf). The first core in the Blue Sands reservoir section, **Core UT-GOM2-2-H003-02F**, was acquired from the depth interval from 2212 to 2222 fbsf. Upon examination in the Geotek Pressure Core Processing Van it was determined that **Core UT-GOM2-2-H003-02F** was recovered at a pressure of 4543 psi and is currently being processed through PCATS. In addition, at the very end of the day **Core UT-GOM2-2-H003-03F** was acquired from 8728 to 8738 ft RKB (2222-2232 fbsf); it was determined later the next day that **Core UT-GOM2-2-H003-03F** was recovered at a pressure of 4542 psi.

The onboard Scientific Party also processed conventionalized **Core UT-GOM2-2-H003-01FB** collecting a paleontological sample from the core-catcher, and whole round interstitial water and microbiological samples from the core. Additional headspace organic geochemistry samples and geomechanical measurements were obtained from the core. The remaining portion of the core will be transported to the post-expedition project established laboratory in Salt Lake City where a wide array of technical core scans, additional subsamples will be taken, and other detailed cores analysis well be performed.

The Scientific Party is working on finalizing the "Methods" section and working on the "Results" sections of the Expedition Report and processing samples and data that has been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last eight days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

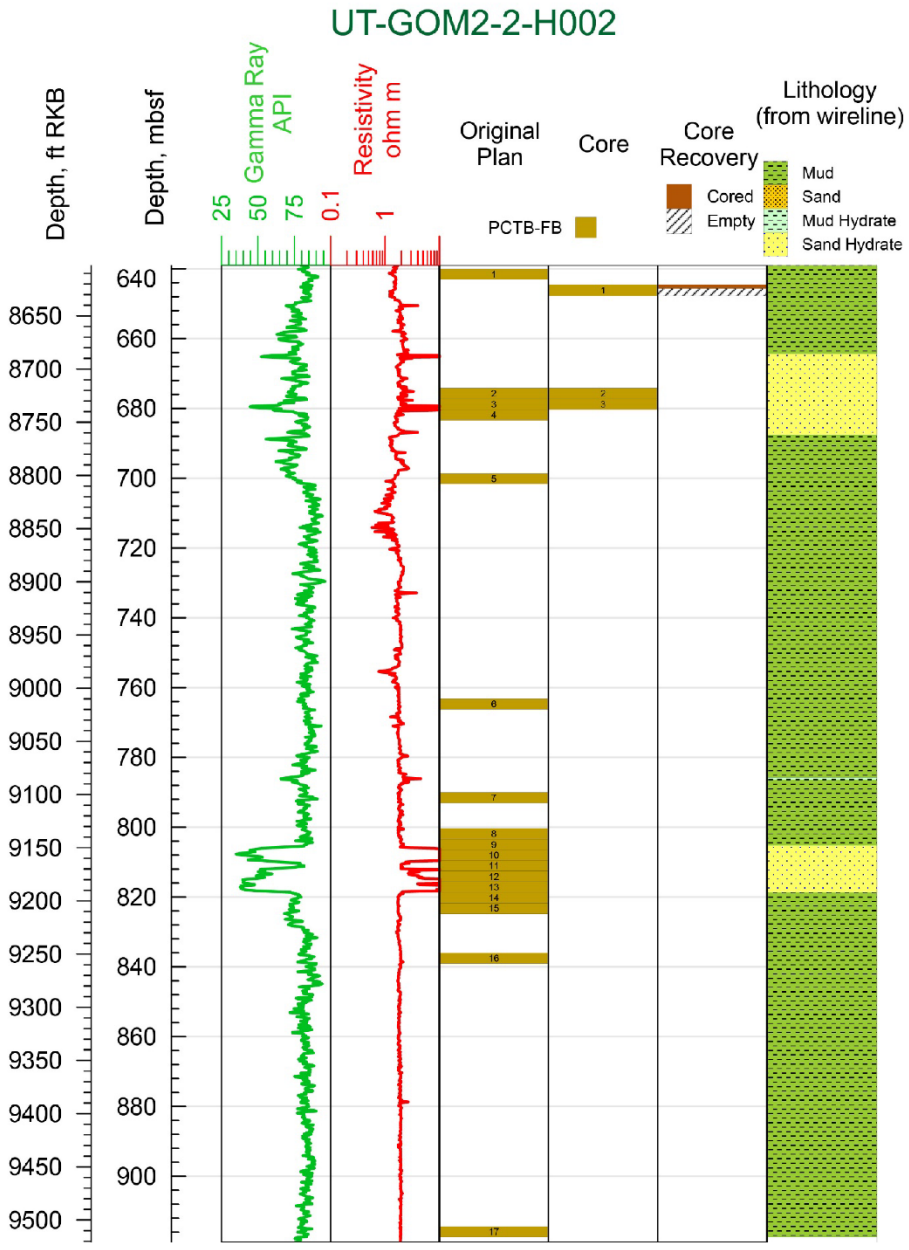

Figure 1: Core recovery plot for the UT-GOM2-2-H002 well as of 24:00 hr 20-AUG-2023. 'PCTB-FB' records core recovered by the face bit version of the Pressure Coring Tool with Ball (PCTB).

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21-August-2023, Cores H002-03FB to H002-04FB, Wireline Separation

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 21-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 21-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 8748 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

0000-0030 Continue to acquire **Core UT-GOM2-2-H003-03FB**, F/8728 - T/8738 ft RKB (2222.0-2232.0 fbsf).
0030-0100 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
0100-0249 Prepare and RIH the PCTB-FB coring tool.
0249-0400 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
0400-0430 Acquire **Core UT-GOM2-2-H003-04FB**, F/8738 - T/8748 ft RKB (2232.0 to 2242.0 fbsf).
0430-0500 Attempted too POOH. Unable to unlatch the PCTB-CS.
0500-0700 After multiple attempts to unlatch the PCTB-CS tool, the slickline parted at the packer in the TDS.
0700-1930 The parted end of the SLB slickline was recovered from the drill pipe and after multiple attempts to again pull the CTB-FB core barrel free it was ultimately decided that the inner barrel to the PCTB-FB could not be removed from the BHA.
1930-2400 M/U to TDS POOH F/8366 to T/5476 ft RKB while laying down doubles of 5 7/8" XT57 drill pipe and slipping and cutting SLB coring wireline.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue to POOH the PCTB-CS BHA while laying down doubles of 5 7/8" XT57 drill pipe; and slipping and cutting SLB coring wireline with each stand.

Blue Sand (and background mud) Coring Campaign

Activity	Ft RKB	fbsf	Completed
H002-01FB-Start	8621	2115	X
H002-01FB End	8631	2125	X
Drill Ahead Start	8631	2125	X
Drill Ahead End	8718	2212	X
H002-02FB Start	8718	2212	X
H002-02FB End	8728	2222	X

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H002-03FB Start	8728	2222	X
H002-03FB End	8738	2232	X
H002-04FB Start	8738	2232	X
H002-04FB End	8748	2242	X

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals: NA

PCTB-FB Coring Totals:

Core UT-GOM2-2-H003-03FB: *4.66* ft (47 % recovery), 4530 psi.

Coring F/ 8728 - T/ 8738 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.5 bpm and 155 psi.

Core UT-GOM2-2-H003-04FB: *8.43* ft (*84*% recovery), 0 psi. (not recovered as of this time)

Coring F/ 8738 - T/ 8748 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.0 bpm and 120 psi.

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Core UT-GOM2-2-H003-03FB was cut from 8728 to 8738 ft RKB (2222-2232 fbsf). This was the second of three consecutive PCTB-FB pressure cores planned for the Blue Sand within the interval from 8718 to 8748 ft RKB (2212-2242 fbsf) in **Hole UT-GOM2-2-H002.** Upon recovery, we found the lower ball valve had properly sealed on the PCTB-FB and the measured pressure in the Geotek Pressure Core Receiving Lab was 4542 psi. The PCATS acquired X-Ray scans along with the gamma-density and P-wave velocity core scans confirmed the recovery of *4.66* ft of core and two probable gas hydrate-bearing sand units (Figure 1). This was our first recovery of sandy core with high hydrate concentrations on the GOM2-2 Expedition.

We next cut **Core UT-GOM2-2-H003-04FB** for 10 feet from 8738 to 8748 ft RKB. The Geotek CTB-FB recovery tool was lowered into the hole and latched into the PCTB-FB core barrel to recover the inner core barrel. We attempted to unlatch the PCTB-FB core barrel by pulling on slickline. However, we could not recover the tool. We applied greater than 10,000 lb pulls and used the rig mud pumps to clear any debris preventing the tool from unlatching. After multiple attempts, the slickline parted at the packer in the TDS. The BHA was raised and stands of pipe were removed until the slickline was encountered in the pipe. The slickline was recovered from the drill pipe and reattached to the SLB wireline spooler. After multiple attempts to again pull the CTB-FB core barrel free, it was ultimately decided that the inner barrel to the PCTB-FB could not be removed from the BHA. We also tried to shear off the slickline from the coring tool, which would allow the running of the CTB-FB emergency recovery tool; however, it was not possible to shear off the slickline. We then cut the slickline allowing it to drop inside of the pipe and proceeded to pull the BHA to the surface. After recovering each stand of pipe, we used a wire cutter to remove the exposed slickline. As of midnight, on 21-AUG-23, we were recovering the BHA to the

surface. **Plans are currently being developed to re-enter Hole UT-GOM2-2-H002 and move ahead with the program to acquire the sequence of pressure cores associated with the high-priority Orange Sand.**

As we look forward, BSEE requires that we make a best effort to P&A (cement) **Hole UT-GOM2-2-H002** after reaching the depth of the Blue Sands. To do so, we will need to re-enter the hole and return to depth above the Blue Sand in order to pump cement; this will provide us with the opportunity to advance the hole to acquire the Orange Sands related cores.

The Scientific Party is working on finalizing the "Methods" section and working on the "Results" sections of the Expedition Report and processing samples and data that has been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last nine days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

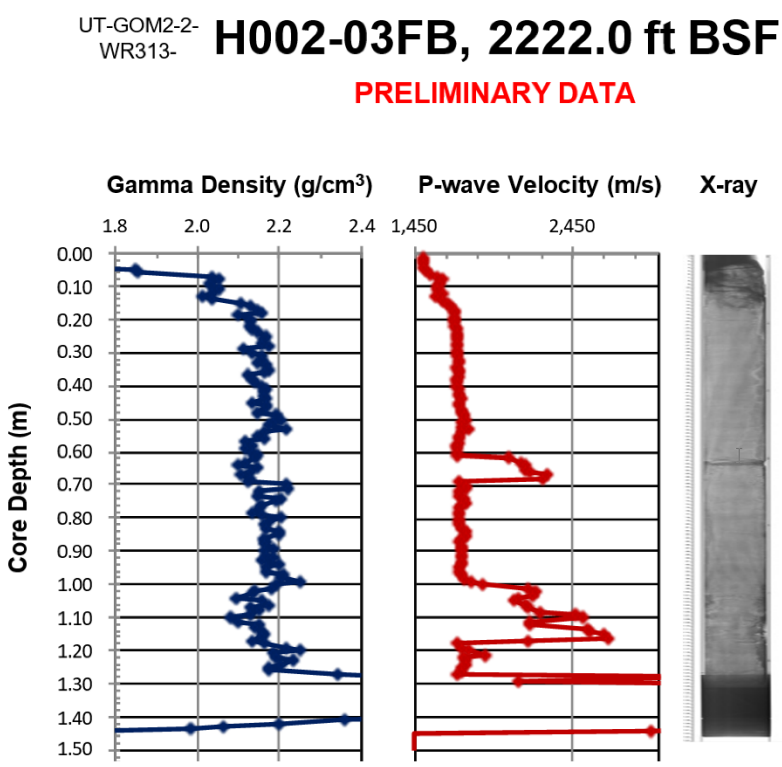

Figure 1: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H002-03FB from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images.

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22-August-2023, Core H002-04FB, Pull out of Hole

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 22-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 22-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 8748 ft MD RKB

***Special Update**: UT DAILY OPERATIONS REPORT, 1024hr on 23-AUG-23: Work 9 7/8 cutting shoe BHA to re-enter WR H002. Delays due to low visibility from mud at mudline. Able to successfully re-enter the wellbore while circulating SW at 1-4 BPM with cement pump. Washed down to 6,829'. Able to slack off with no WOB and no rotation. This confirmed re-entry of hole UT-GOM2-2-H002. Line up Hex pump with 10.3 ppg WBM. Prepare to displace work string. -Thomas Redd*

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0900-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck.

0000-0300 Perform electrical repairs on the iron roughneck (short in jumper line).
0300-0900 Continue to POOH (**Hole UT-GOM2-2-H002**) the PCTB-FB BHA and **Core UT-GOM2-2-H003-04FB** from 5476 ft RKB to surface while laying down doubles of 5 7/8" X T57 drill pipe.
0900-1000 Breaking down BHA and laying down drill collars.
1000-1200 Geotek broke down the BHA and remove PCTB-FB core barrel from BHA.
1200-1230 Installed new PDC Face Bit.
1230-1430 Spaced out PCTB-CS and Center Bit Assembly.
1430-1515 MU and RIH BHA 293 ft RKB.
1515-2230 Continue to RIH on doubles F/293 – T/6484 ft RKB.
2230-2400 Position vessel over **Hole UT-GOM2-2-H002** and began to wash and jet into hole (re-entering operations).

4. OPERATIONAL PLAN (Next 24 Hours):
After re-entering **Hole UT-GOM2-2-H002** at the seafloor, continue to RIH and drill to the PCTB-CS core point at the top of the Blue Sand section at a hole depth of 9132 ft MD RKB.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA

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Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals:
Core UT-GOM2-2-H003-04FB: *8.43* ft (*84%* recovery), 0 psi. *(updated information)*
Coring F/ 8738 - T/ 8748 ft RKB at 80 rpm, maintaining 8-10k on bit, CMT pumping 10.3 ppg WBM at 3.0 bpm and 120 psi.

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

In support of dealing with the operational problems from 21-AUG-23, we continued to POOH (**Hole UT-GOM2-2-H002**) the PCTB-FB BHA and **Core UT-GOM2-2-H003-04FB** that had become previously stuck in the BHA. Upon the recovery and inspection of the PCTB-FB BHA and **Core UT-GOM2-2-H003-04FB** inner barrel, a heavy gauge wire was found lodged in the unlatching collet of the retrieval tool latch. In addition, the pawls and other components of the upper latch on the PCTB-FB were severely damaged, most likely by the numerous wireline pulling events that we implemented when trying to unlatch the tool when it became stuck in the BHA. The additional observed damage to the latch likely exacerbated the problem with the latching system.

After **Core UT-GOM2-2-H003-04FB** was extracted from the recovered PCTB-FB BHA, it was confirmed that the integrated sealing system was not fully engaged and the core was recovered unsealed with no pressure. Thus, the conventionalized **Core UT-GOM2-2-H003-04FB** was transferred to the Geotek Core Receiving Van for processing. The appearance of the core suggested the presence of a < 3 ft long gas-hydrate-bearing sand-to-silt section with mousse-like to soupy texture that appeared to be bounded by two mud-rich sedimentary sections. We collected the two sets of WRC microbiological (MBIO) and interstitial water (IW) sample sets to further characterize the inferred hydrate-bearing section in the recovered core. In addition, a standard set of headspace gas samples (HS); along with vane-shear (VANE) and pocket penetrometer (PEN) measurements were acquired from the core. Analysis conducted in the onboard IW laboratory of the core acquired pore-water samples indicated that the core did contain gas hydrate within anomalous section as observed in **Core UT-GOM2-2-H003-04FB.**

Cores UT-GOM2-2-H003-02FB and **-03FB** are also being processed through PCATS (Figure 1 and 2). Based on the PCATS acquired gamma-density and P-wave scans, **Core UT-GOM2-2-H003-02FB** contains two gas hydrate-bearing sand beds. The core will be sub-sectioned into a quantitatively degassed sample, a MBIO cryo core, and a 100 cm long section will be stored for further analysis in the post-expedition labs in Salt Lake City. The "cut plan" for **Core UT-GOM2-2-H003-02FB** also calls for storing two apparent gas-hydrate bearing intervals in a storage chamber for later analysis in Salt Lake City. In addition, a 35 cm long section of the core will be quantitively degassed and an IW core sample will be taken.

The Scientific Party is working on finalizing the "Methods" section and working on the "Results" sections of the Expedition Report and processing samples and data that has been collected during the expedition.

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There have been no new COVID cases on the *Q4000* in the last eight days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
RIH	Run in hole
RKB	Depth measured from the rig floor
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system

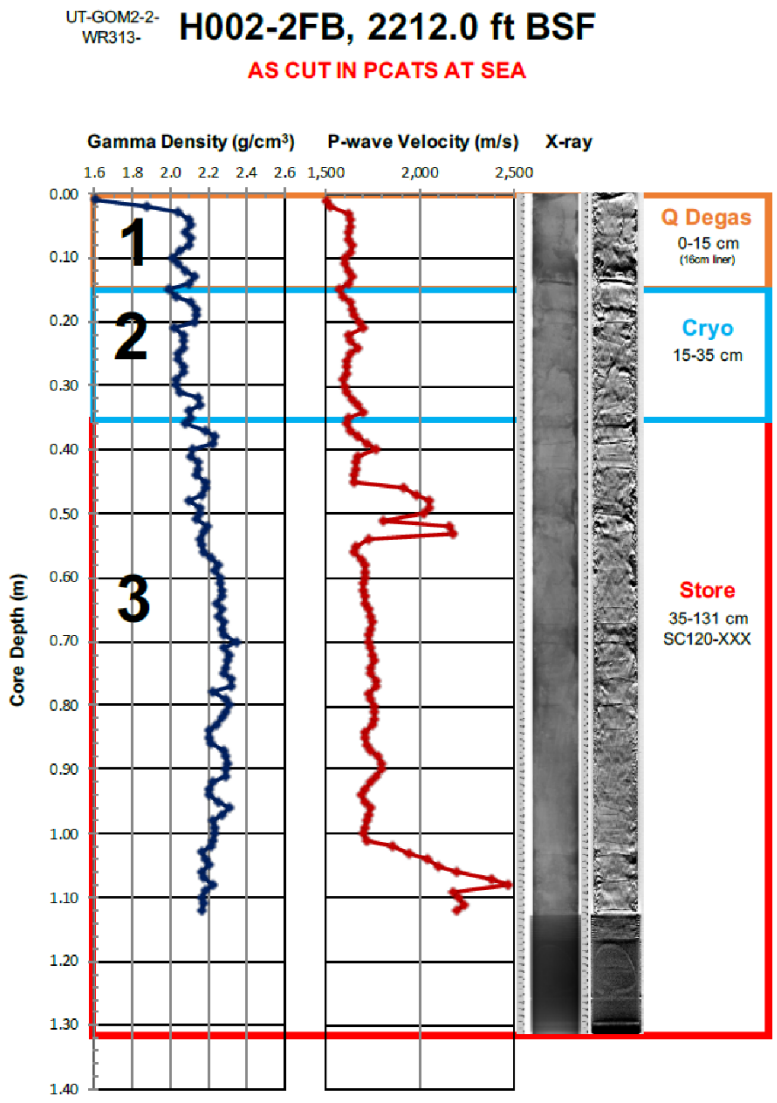

Figure 1: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H002-02FB from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images. The colored boxes show cuts made in PCATS for storage, quantitative degassing, and frozen cryo cores.

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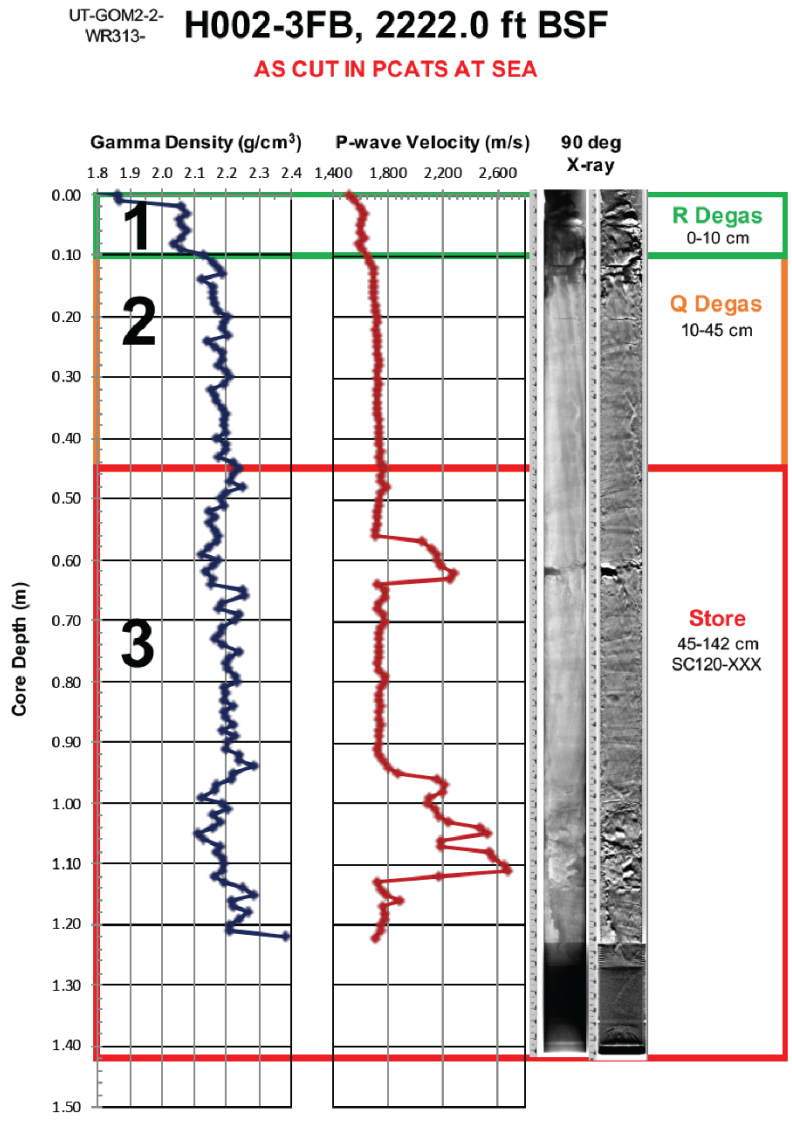

Figure 2: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H002-03FB from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images. The colored boxes show cuts made in PCATS for storage, quantitative degassing, and frozen cryo cores.

UT-GOM2-2_Daily_Science_Report_08_22_23_Final

23-August-2023, Re-enter Hole, Drill Ahead

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 23-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 23-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9132 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck and complete daily crane review/report.

0000-0000 The Q4000 was positioned over **Hole UT-GOM2-2-H002** and was preparing to wash/jet into hole (re-entering operations).
0000-0600 Re-enter advance **Hole UT-GOM2-2-H002** F/ 6506 T/6829 ft RKB
0112: 1 stab-in and advance, with weight on bit (WOB) (inferred from hook load)
Move vessel, wait for visibility to clear
0149: 2 stab-ins and advance, with WOB
Move vessel, wait for visibility to clear
0414: 1 stab-ins and advance, with WOB
Move vessel, wait for visibility to clear
0448: 1 stab-ins and advance, with WOB
0550: 4 stab-ins and advance, with WOB
0600: At a depth of 6829 ft RKB. Able to slack off drill string with no WOB and no rotation. Confirmed re-entry into **Hole UT-GOM2-2-H002.**
0600-1020 Continue to RIH **Hole UT-GOM2-2-H002** F/6829 T/8617 ft RKB.
1020-1200 Washed and reamed from F/8617 T/8748 ft RKB, pumping 10.3 ppg water-based mud (WBM) at 7 bpm with 71 psi.
1200-1230 Drilled ahead from F/8748 T/8776 ft RKB, pumping 10.3 ppg WBM at 300 GPM with 50 psi.
1230-1330 Repair TDS brake and release brake friction.
1330-2030 Drilled ahead from F/8776 T/9132 ft RKB (core point), pumping 10.5 ppg WBM with 50 psi at 300 GPM, 70 RPM, 3-4k torque. Pumping high viscosity sweeps every 100 ft.
2030-2045 Rig down (R/D) Night Cap, rig up (R/U) Pack off, Cable head, R/U upper wireline (W/L) sheave, and slick line in sheave on TDS.
2045-2245 Pick up (P/U) and RIH Geotek Center Bit Retrieval Tool, latch into Center Bit, and POOH.
2245-2400 Prepare and RIH the PCTB-CS coring tool.

4. OPERATIONAL PLAN (Next 24 Hours):

Acquire approximately four of the eight planned consecutive PCTB-CS pressure cores in **Hole UT-GOM2-2-H002** associated with the Orange Sand within depth interval from 9132 to 9212 ft RKB:

Core UT-GOM2-2-H003-05CS, 2626.0 to 2636.0 fbsf
Core UT-GOM2-2-H003-06CS, 2636.0 to 2646.0 fbsf
Core UT-GOM2-2-H003-07CS, 2646.0 to 2656.0 fbsf
Core UT-GOM2-2-H003-08CS, 2656.0 to 2666.0 fbsf

Orange Sand (and bounding mud) Coring Campaign

Activity	Ft RKB	fbsf	Completed
H002-05CS Start	9132	2626	
H002-05CS End	9142	2636	
H002-06CS Start	9142	2636	
H002-06CS End	9152	2646	
H002-07CS Start	9152	2646	
H002-07CS End	9162	2656	
H002-08CS Start	9162	2656	
H002-08CS End	9172	2666	
H002-09CS Start	9172	2666	
H002-09CS End	9182	2676	
H002-10CS Start	9182	2676	
H002-10CS End	9192	2686	
H002-11CS Start	9192	2686	
H002-11CS End	9202	2696	
H002-12CS Start	9202	2696	
H002-12CS End	9212	2706	

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The last 24 hours of operations on the *Helix D/V Q4000* has included the successful completion of one of the most critical phases of the GOM2-02 Expedition with the re-entry of **Hole UT-GOM2-2-H002** at 0600 hr. As recorded above in this report, the PCTB-CS deployed BHA (with Geotek Center Bit) reached the seafloor over the location of the well head for **Hole UT-GOM2-2-H002** just after midnight of 22-AUG-23. Both of the *Helix D/V Q4000* ROVs had been deployed to the seafloor to assist with the **Hole UT-GOM2-2-H002** re-entry**.** The visual examination of the surveyed location of the expected well head revealed a large, elongated, crater like feature with dimensions exceeding 20 by 40 ft in size. The crater was filled with a soup-like mixture of drilling mud and borehole cuttings; with no visible evidence of the well head opening. The decision was made to move ahead with the borehole re-entry, with the bit being moved into position over the well head associated crater by making small, controlled movements of the Q4000. The specific location for the first attempted stab-in of the hole was based on the comparison of the physical appearance of the site with ROV images obtained during previous drilling operations. The fist attempted stab into the hole involved advancing the drill bit about 30 ft into the subsurface where the Q4000 rig monitoring system detected weight on bit (as inferred from the hook load coming off), which indicated that we had not entered the hole. Over the next ~5 hours there were multiple attempts to enter the hole through a series of ship moves and additional stab-in attempts, which often required long waiting periods to allow the visibility in and around the site to clear after sediment was suspended in the water column during previous re-entry attempts. Finally, at 0600 hr and at a bit depth of 6829 ft RKB it was observed that the drill string was hanging freely in open hole with no weight on bit; thus confirming that we had successfully re-entered **Hole UT-GOM2-2-H002.** The successful re-entry of **Hole UT-GOM2-2-H002** allowed the resumption of operations that would now allow the expedition to move ahead and acquire pressure cores from critical Orange Sand stratigraphic section.

After successfully re-entering **Hole UT-GOM2-2-H002,** the PCTB-CS BHA was advanced to the previous total depth of the hole at 8748 ft RKB relatively quickly. The hole was than advanced by drilling to a depth of 9132 ft RKB which was the core point for the fist PCTB-CS core associated with the Orange Sand continuous pressure coring campaign.

The onboard scientific party also moved ahead with processing of **Cores UT-GOM2-2-H003-02FB and -03FB. Core UT-GOM2-2-H003-02FB** was processed according to the cut plan with one 96 cm section stored under pressure for onshore analysis. A 20 cm cryo sample was cut, frozen, depressurized, and stored at -80 °C for microbiological analyses. A short 15 cm sample was degassed and stored for later sediment description. **Core UT-GOM2-2-H003-03FB** was cut into a 96 cm section stored in a pressurized storage chamber for onshore analyses and a 35 cm section for quantitative degassing. This degassing, from a mud interval, revealed a concentration of methane lower than solubility with no methane hydrate. After depressurization, this section was subsampled for interstitial water (IW) squeezing, leaving reaming core for sediment description and vane-shear/pocket penetrometer measurements. Other subsamples were collected for cell counts, headspace gas, and micropalcontology.

The Scientific Party is working on finalizing the "Methods" section and working on the H003 and H002 "Results" sections of the Expedition Report and processing samples and data that have been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last nine days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up

UT-GOM2-2_Daily_Science_Report_08_23_23_Final

PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

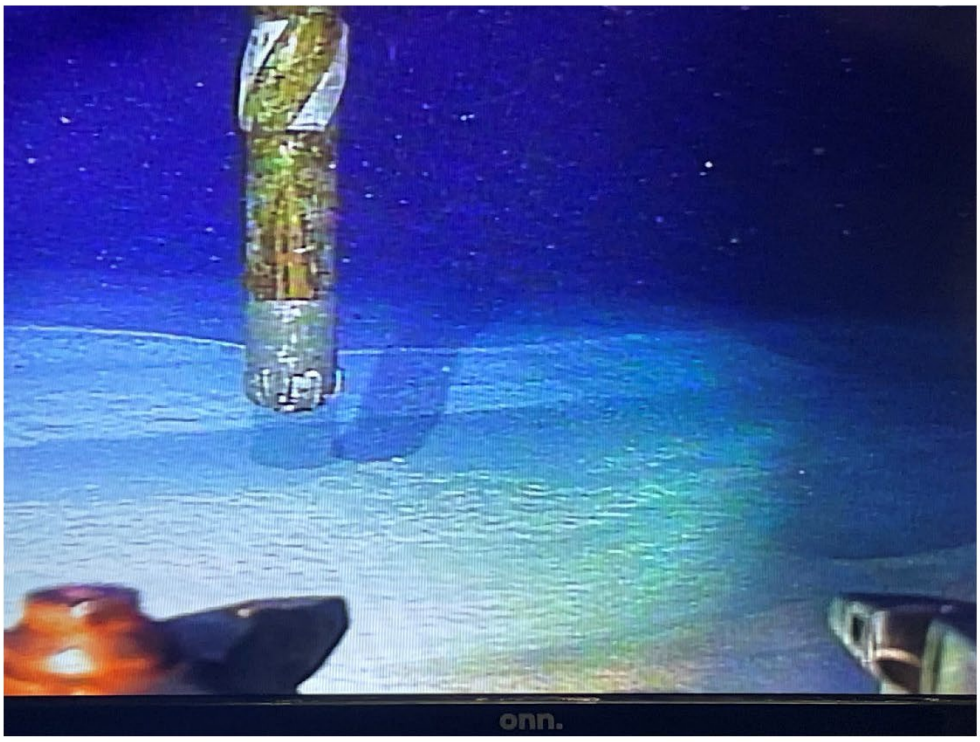

Figure 1: Helix D/V Q400 ROV acquired image of the re-entry into ***Hole UT-GOM2-2-H002****. Visible is the edge of the crater like feature that marked the location of the expected well head at the seafloor; note the lack of any well head like features that was ultimately proven to be the surface location of the hole.*

UT-GOM2-2_Daily_Science_Report_08_23_23_Final

24-August-2023, Cores H002-05CS to H002-10CS

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 24-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 24-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9192 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck and complete daily crane review/report. Transfer bulk hose to and from *M/V Harvey Hermes*.

0000-0015 Continue to RIH (**Hole UT-GOM2-2-H002)** the PCTB-CS coring tool in order to acquire **Core UT-GOM2-2-H002-05CS** at the start of a planned eight (now nine) consecutive PCTB-CS pressure core deployments associated with the Orange Sand Coring Campaign.
0015-0130 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
0130-0230 Acquire **Core UT-GOM2-2-H002-05CS**, F/9132 - T/9142 ft RKB (2626.0-2636.0 fbsf).
0230-0330 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
0330-0532 Prepare and RIH the PCTB-FB coring tool.
0532-0700 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
0700-0730 Acquire **Core UT-GOM2-2-H002-06CS**, F/9142 - T/9152 ft RKB (2636.0-2646.0 fbsf).
0730-0900 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
0900-0956 Prepare and RIH the PCTB-FB coring tool.
0956-1100 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1100-1130 Acquire **Core UT-GOM2-2-H002-07CS**, F/9152 - T/9162 ft RKB (2646.0-2656.0 fbsf).
1130-1245 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
1245-1330 Prepare and RIH the PCTB-FB coring tool.
1330-1430 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1430-1500 Acquire **Core UT-GOM2-2-H002-08CS**, F/9162 - T/9172 ft RKB (2656.0-2666.0 fbsf).
1500-1615 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
1615-1730 Prepare and RIH the PCTB-FB coring tool.
1730-1830 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1830-1900 Acquire **Core UT-GOM2-2-H002-09CS**, F/9172 - T/9182 ft RKB (2666.0-2676 fbsf).
1900-2015 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
2015-2200 Prepare and RIH the PCTB-FB coring tool.
2200-2300 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
2300-2330 Acquire **Core UT-GOM2-2-H002-10CS**, F/9182 - T/9192 ft RKB (2676.0-2686 fbsf).

4. OPERATIONAL PLAN (Next 24 Hours):

Acquire last three of the eight (now nine) planned consecutive PCTB-CS pressure core runs in **Hole UT-GOM2-2-H002** associated with the Orange Sand within a depth interval from 9132 to 9222 ft RKB:

Core UT-GOM2-2-H003-11CS, 2686.0 to 2696.0 fbsf
Core UT-GOM2-2-H003-12CS, 2696.0 to 2706.0 fbsf
Core UT-GOM2-2-H003-13CS, 2706.0 to 2716.0 fbsf

Orange Sand (and bounding mud) Coring Campaign

Activity	Ft RKB	fbsf	Completed
H002-05CS Start	9132	2626	X
H002-05CS End	9142	2636	X
H002-06CS Start	9142	2636	X
H002-06CS End	9152	2646	X
H002-07CS Start	9152	2646	X
H002-07CS End	9162	2656	X
H002-08CS Start	9162	2656	X
H002-08CS End	9172	2666	X
H002-09CS Start	9172	2666	X
H002-09CS End	9182	2676	X
H002-10CS Start	9182	2676	X
H002-10CS End	9192	2686	X
H002-11CS Start	9192	2686	
H002-11CS End	9202	2696	
H002-12CS Start	9202	2696	
H002-12CS End	9212	2706	
H002-13CS Start	9212	2706	
H002-13CS End	9222	2716	

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals:

Core UT-GOM2-2-H002-05CS: 7.61 ft (76% recovery), 4566 psi.
Coring F/ 9132 - T/ 9142 ft RKB at 80 rpm, maintaining 6-10k on bit, CMT pumping 10.5 ppg WBM at 5.0 bpm and 122 psi.

Core UT-GOM2-2-H002-06CS: 8.89 ft (89 % recovery), 3784 psi.

Coring F/ 9142 - T/ 9152 ft RKB at 80 rpm, maintaining 10-18k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 103 psi.

Core UT-GOM2-2-H002-07CS: 4.07 ft (41 % recovery), 4503 psi.
Coring F/ 9152 - T/ 9162 ft RKB at 80 rpm, maintaining 6-10k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 110 psi.

Core UT-GOM2-2-H002-08CS: *9.81* ft (*98* % recovery), 4631 psi.
Coring F/ 9162 - T/ 9172 ft RKB at 80 rpm, maintaining 8-18k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 90 psi.

Core UT-GOM2-2-H002-09CS: 8.20 ft (82 % recovery), 0 psi.
Coring F/ 9172 - T/ 9182 ft RKB at 80 rpm, maintaining 15-18k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 90 psi.

Core UT-GOM2-2-H002-10CS: 4.07 ft (41% recovery), 2777 psi.
Coring F/ 9182 - T/ 9192 ft RKB at 80 rpm, maintaining 15-18k on bit, CMT pumping 10.5 ppg WBM at 4.0 bpm and 200 psi.

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The last 24 hours of operations on the *Helix D/V Q4000* has dealt with advancing **Hole UT-GOM2-2-H002** from a depth of 2626 fbsf (9132 ft RKB) to a total depth of 2686 fbsf (9192 ft RKB) by the deployment of the first six PCTB-CS pressure cores of the planned set of eight (now nine) cores that are targeting the Orange Sand (and bounding mud). The Orange Sand was first identified in the logging while drilling (LWD) data as acquired in the WR313H-001 well during the 2009 Joint Industry Project Expedition II (JIP Leg II). The Orange sand is the thickest and is believed to be the cleanest (consistently low gamma-ray) reservoir penetrated in the Terrebonne Basin based on the LWD data acquired during JIP Leg II. The Orange Sand may represent a levee deposit on the flank of a submarine channel, or it represents a regional sheet sand that was subsequently incised by the inferred channel. We interpret that the turbidite flows that formed the Orange Sand were less mud prone, likely higher-energy, that they are likely coarser grain-size and they have greater bed-thickness than the sandy silt levee deposits cored in GC 955 during the GOM2-1 Expedition in 2017. The Orange Sand has been identified as a key research target during UT-GOM2-2.

A total of five of the six PCTB-CS pressure cores acquired today were recovered at pressure, with the recovery pressure of four of the cores being near the set boost pressure for these core runs. It is important to highlight in a "continuous" pressure core program that the function of PCATS becomes to quickly and safely transfer recovered cores from their pressurized autoclave to a set of 350-cm-long temporary storage vessels that are integrated into the PCATS system. This allows the PCTB-CS autoclaves to be quickly rebuilt and returned to service. One limitation of this modified PCATS processing program is that we only have enough time to complete a single-axis X-ray scan of each core and not the more informative gamma-density and P-wave velocity scans (these scans will be collected along with the more detailed CT-scans as time permits later in the expedition). With X-ray only images of the cores it is not possible to differentiate gas hydrate-bearing sediment cores from water-bearing cores. Thus, the following descriptions of the cores are highly preliminary.

The percent of core recovery for the first two cores **(Core UT-GOM2-2-H002-05CS and -06CS)** in this campaign were high in what we have preliminary interpreted to have been dominantly mud-rich cores. **Core UT-GOM2-2-H002-07CS**, with only limited recovery, may have cored a sediment contact between

a mud-dominated and hydrate-bearing sedimentary section. The X-ray image **Core UT-GOM2-2-H002-08CS**, which was nearly a full core, revealed a complex geologic section that without additional data cannot be fully evaluated at time. **Core UT-GOM2-2-H002-09CS** was the only core in today's coring campaign to be recovered without pressure. However, it did yield important sedimentologic data (i.e., fine grain silt to mud rich sediment core) that helped us to further direct the ongoing coring program. **Core UT-GOM2-2-H002-09CS** was also processed as a conventional core and important interstitial-water, microbiological, and headspace geochemistry samples were collected from the core. **Core UT-GOM2-2-H002-10CS** was the only core from today's effort that we had enough time to complete all of the PCATS scans as shown in Figure 1, which showed a series of prominent hydrate-bearing intervals recovered in the upper 60 cm of this core.

The Scientific Party is working on finalizing the "Methods" section and working on the H003 and H002 "Results" sections of the Expedition Report and processing samples and data that have been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last ten days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

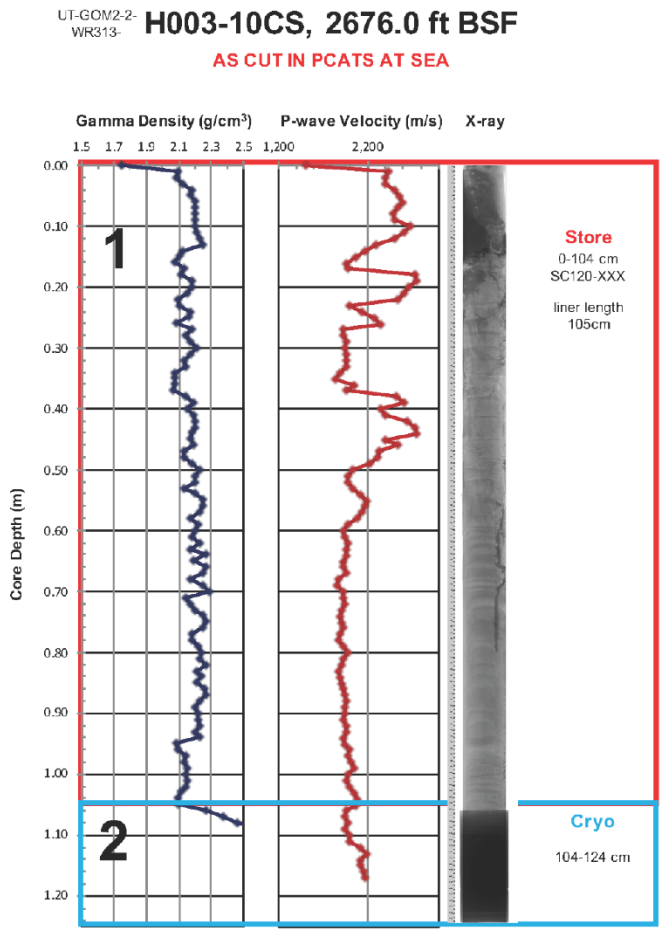

Figure 1: X-ray, P-wave velocity, and density of Core UT-GOM2-2-H002-10CS from the Geotek Pressure Core Analysis and Transfer System (PCATS). Gamma density and P-wave velocity logs along with the X-ray images and "as cut core in PCATS and position of conventionalized core samples and measurements.

25-August-2023, Cores H002-10CS to H002-13CS

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 25-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 25-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9222 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck and complete daily crane review/report. Offload and backload the *M/V Harvey Hermes*. Lowered groceries down the galley hatch.

0000-0055 Continue to POOH (**Hole UT-GOM2-2-H002)** the PCTB-CS coring tool in order to acquire **Core UT-GOM2-2-H002-10CS,** which represented the sixth of the planned nine consecutive PCTB-CS pressure core deployments associated with the Orange Sand Coring Campaign.
0055-0200 Prepare and RIH the PCTB-FB coring tool.
0200-0300 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
0300-0330 Acquire **Core UT-GOM2-2-H002-11CS**, F/9192 - T/9202 ft RKB (2686.0-2696.0 fbsf).
0330-0830 Attempted to POOH PCTB-CS, unable to pull the PCTB-CS beyond ~200 out of the coring shoe. Recover the PCTB retrieval tool.
0830-0945 R/D SLB slickline and slip/cut 100 ft wireline. R/U pack off in the TDS and SLB slickline.
0945-1200 M/U and RIH Geotek Emergency Pulling Tool, at 8826 ft RKB latched into PCTB-CS and attempt to recover tool.
1200-1300 SLB slickline pulled core barrel free and continued to pull to surface. Placed **Core UT-GOM2-2-H002-11CS** in ice shuck.
1300-1700 Prepare and RIH the PCTB-FB coring tool.
1700-1830 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1830-1900 Acquire **Core UT-GOM2-2-H002-12CS**, F/9202 - T/9212 ft RKB (2696.0-2706.0 fbsf).
1900-2030 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
2030-2145 Prepare and RIH the PCTB-FB coring tool.
2145-2300 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
2300-2330 Acquire **Core UT-GOM2-2-H002-13CS**, F/9212 - T/9222 ft RKB (2706.0-2716.0 fbsf).
2330-2400 2030 POOH PCTB-CS coring tool.

4. OPERATIONAL PLAN (Next 24 Hours):

UT-GOM2-2_Daily_Science_Report_08_25_23_Final

After recovering **Core UT-GOM2-2-H003-13CS** advance the hole by drilling to a depth of 9277 ft RKB and acquire **Core UT-GOM2-2-H003-14CS.** Next, advance the hole by drilling to a depth of 9322 ft RKB and acquire **Cores UT-GOM2-2-H003-15CS and -16CS.**

Core UT-GOM2-2-H003-14CS, 2771.0 to 2781.0 fbsf
Core UT-GOM2-2-H003-15CS, 2816 to 2826.0 fbsf
Core UT-GOM2-2-H003-16CS, 2826.0 to 2836.0 fbsf

Orange Sand (and bounding mud) Coring Campaign – End of Program

Activity	Ft RKB	fbsf	Completed
H002-05CS Start	9132	2626	X
H002-05CS End	9142	2636	X
H002-06CS Start	9142	2636	X
H002-06CS End	9152	2646	X
H002-07CS Start	9152	2646	X
H002-07CS End	9162	2656	X
H002-08CS Start	9162	2656	X
H002-08CS End	9172	2666	X
H002-09CS Start	9172	2666	X
H002-09CS End	9182	2676	X
H002-10CS Start	9182	2676	X
H002-10CS End	9192	2686	X
H002-11CS Start	9192	2686	X
H002-11CS End	9202	2696	X
H002-12CS Start	9202	2696	X
H002-12CS End	9212	2706	X
H002-13CS Start	9212	2706	X
H002-13CS End	9222	2716	X

5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals:

Core UT-GOM2-2-H002-11CS*: 0.59 ft (5.9% recovery), 4708 psi.*
Coring F/ 9192 - T/ 9202 ft RKB at 80 rpm, maintaining 10-12k on bit, CMT pumping 10.5 ppg WBM at 2.0 bpm and 58 psi.

Core UT-GOM2-2-H002-12CS*: 8.20 ft (82% recovery), 0 psi.*
Coring F/ 9202 - T/ 9212 ft RKB at 80 rpm, maintaining 10-12k on bit, CMT pumping 10.5 ppg WBM at 2.0 bpm and 58 psi.

Core UT-GOM2-2-H002-13CS*: NA ft (NA% recovery), 0 psi. (in core receiving)*

Coring F/ 9212 - T/ 9222 ft RKB at 80 rpm, maintaining 10-12k on bit, CMT pumping 10.5 ppg WBM at 2.0 bpm and 58 psi.

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The last 24 hours of operations on the *Helix D/V Q4000* has dealt with advancing **Hole UT-GOM2-2-H002** from a depth of 2686 fbsf (9192 ft RKB) to a total depth of 2716 fbsf (9222 ft RKB) by the deployment of three PCTB-CS pressure cores, marking the end of the Orange Sand Coring Campaign (Figure 1).

In review, the first core recovered today was **Core UT-GOM2-2-H002-11CS,** which was recovered at a pressure of 4708 psi, and yielded a core section length of only about 0.59 ft. **Cores UT-GOM2-2-H002-12CS and -13CS,** which targeted the well log inferred mud-rich section at the base of the Orange Sand, were recovered unsealed and not at pressure. However, both cores were nearly filled with sediment, which appeared to be mostly mud rich and contained gas voids.

For the three PCTB-CS cores recovered today, two of the cores were recovered without pressure (**Cores UT-GOM2-2-H002-12CS and -13CS**). The coring tool DST recorded temperature and pressure histories for the two cores that failed to maintain pressure were examined to assess any performance issues associated with these two core deployments. This analysis focused on the comparison of the PCTB-CS set boost pressure, which was set at 4500 psi for both of these cores, and the calculation of the likely bottom hole pressure conditions. Assuming a total hole depth of 9222 ft RKB and a mud weight of 10.3 ppg, we would expect a downhole static pressure of about 4434 psi, which is near the pre-deployment set boost pressure for the PCTB-CS. It was suggested that the reason for the tool not sealing may because of the small difference between the core tool set boost pressure and the downhole measured and calculated static pressure. It has been shown in the past that some differential pressure is required to effectively seal the lower ball valve and other seals in the PCTB core system. Thus, a plan was developed and reviewed to raise the boost pressure for the next PCTB-CS deployment to a targeted pressure of 5200 psi. Because of the operational requirement to drill down to the core depth of 9277 ft RKB (**Core UT-GOM2-2-H002-14CS**), we do not expect to acquire this core until early on the afternoon of 26-AUG-23.

The Scientific Party is working on finalizing the writing assignments in support of the hole section descriptions in the Expedition Report and processing samples and data that have been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last eleven days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch

P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

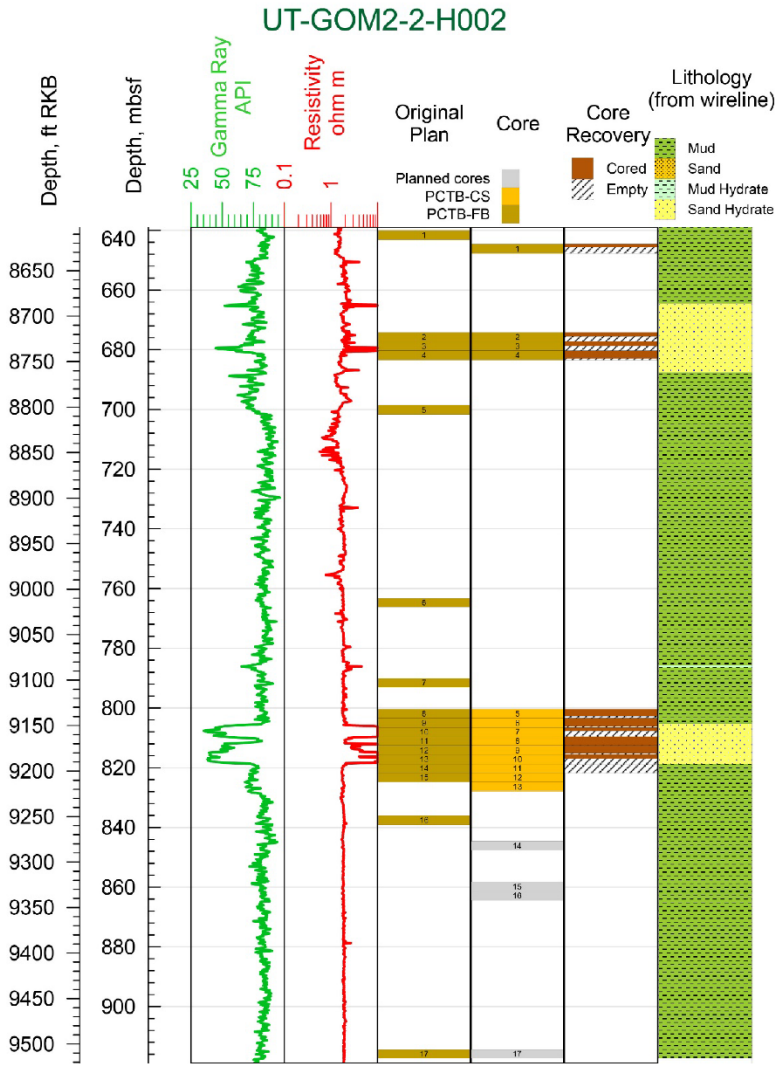

Figure 1: Core recovery plot for the UT-GOM2-2-H002 well as of 24:00 hr 25-AUG-2023. 'PCTB-FB' records core recovered by the face bit version of the Pressure Coring Tool with Ball (PCTB).

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26-August-2023, Cores H002-13CS to H002-14CS, Gyro Survey

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 26-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 26-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck. Mud transfer from the *M/V Harvey Spirit.*

0000-0052 Continue to acquire **Core UT-GOM2-2-H002-13CS**, F/9212 - T/9222 ft RKB (2706.0-2716.0 fbsf), which was the ninth and final core within the **Hole UT-GOM2-2-H002** PCTB-CS Orange Sand Pressure Coring Campaign.
0052-0330 M/U and RIH Geotek Center Bit to a depth of 9222 ft RKB and latch Center Bit into the BHA and continue to RIH.
0330-0600 Advance the hole by drilling F/9222 to T/9277 ft RKB by, while pumping 10.5 ppg WBM at 7 bpm with 100 psi, 70 RPM, maintain 0-10 k WOB.
0600-0810 Pick up (P/U) and RIH Geotek Center Bit Retrieval Tool, latch into Center Bit, and POOH.
0810-1030 Prepare and RIH the PCTB-FB coring tool.
1030-1215 SLB slickline RIH a PCTB-CS to 9272 ft RKB inadvertently actuated. SLB slickline POOH to surface to replace PCTB-CS.
1215-1300 Prepare and RIH the PCTB-FB coring tool.
1300-1430 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.
1430-1500 Acquire **Core UT-GOM2-2-H002-14CS**, F/9277 - T/9287 ft RKB (2771.0-2781.0 fbsf).
1500-1600 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
1600-1810 Pickup (P/U) and RIH Geotek Center Bit, latch into BHA.
1810-1915 Advance the hole by drilling F/9287 to T/9322 ft RKB, while pumping 10.5 ppg WBM at 7 bpm with 100 psi, 70 RPM, maintain 0-10 k WOB.
1915-2100 Prepare run directional survey in **Hole UT-GOM2-2-H002**, RIH Gyro-Data Omega – 1.875 inch Battery Slickline Gyro and performed a gyro survey at a measured depth of 9268 ft RKB. POOH the gyro survey tool.
2100-2200 Pick up (P/U) and RIH Geotek Center Bit Retrieval Tool, latch into Center Bit, and POOH.

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2200-2320 Prepare and RIH the PCTB-FB coring tool (for **Core UT-GOM2-2-H002-15CS**).
2320-2400 POOH from depth with PCTB setting tool and RIH the PCTB retrieval tool.

4. OPERATIONAL PLAN (Next 24 Hours):

Finish acquiring **Core UT-GOM2-2-H003-15CS,** which is now the last core in the operational plan for **Hole UT-GOM2-2-H002.** The operational plan next calls for pulling the bit back to above the Orange Sand and setting a ~300 ft long cement plug.

5. DOWNHOLE LOGGING OPERATIONS:

Hole: Hole UT-GOM2-2-H002

Wireline Totals (directional): The wireline deployed (memory sonde) gyroscopic logging services on the Q4000 are being provided by Gyro-Data, who used an Omega – 1.875 inch Battery Slickline Gyro to perform the directional surveys in **Hole UT-GOM2-2-H002** at a depth of 9268 ft RKB (2762 fbsf), which recorded a borehole inclination at 0.47° at an azimuth of 78.33°. This survey is again within the BSEE inclination limit of 3.0° for a deviated well classification.

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals:

Core UT-GOM2-2-H002-13CS*: 11.29 ft (113% recovery), 0 psi. (in core receiving)*
Coring F/ 9212 - T/ 9222 ft RKB at 80 rpm, maintaining 10-12k on bit, CMT pumping 10.5 ppg WBM at 2.0 bpm and 58 psi.

Core UT-GOM2-2-H002-14CS*: 11.29 ft (113% recovery), 0 psi. (in core receiving)*
Coring F/ 9277 - T/ 9287 ft RKB at 80 rpm, maintaining 15-22k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 100 psi.

Core UT-GOM2-2-H002-15CS*: 4.10 ft (41% recovery), 0 psi. (in core receiving)*
Coring F/ 9322 - T/ 9332 ft RKB at 80 (?) rpm, maintaining 15-22k (?) on bit, CMT pumping 10.5 ppg WBM at 2.0 bpm (?) and 58 psi (?).

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

The last 24 hours of operations on the *Helix D/V Q4000* has dealt with advancing **Hole UT-GOM2-2-H002** from a depth of 2706 fbsf (9212 ft RKB) to a total depth of 2826 fbsf (9332 ft RKB) by the deployment of three PCTB-CS pressure cores, marking the end of coring operations in **Hole UT-GOM2-2-H002** (Figure 1; Table 1).

The three PCTB-CS cores recovered today **(Core UT-GOM2-2-H002-13CS, -14CS, and 015CS)** were recovered without pressure. However, **Core UT-GOM2-2-H002-13CS and -14CS** each yielded over 11 ft of sediment core, which because of expansion due to gas voids in the cores, the recovered cores were actually longer than the "throw" for each of these cores. **Core UT-GOM2-2-H002-13CS** also recovered about 4.1 ft of sediment. Each of the cores acquired today targeted the well log inferred mud-rich sections below the base of the Orange Sand and just above the projected depth of the base of the gas hydrate stability field at this site. These cores are expected to provide information about the rate and direction of solute diffusion in the sedimentary section below the hydrate-bearing sand section at this site, which in

turn will provide insights on fluid flow within the sand. Modeling studies of free gas and water flow in the sand sections at this site from below the base of the gas hydrate stability zone are expected to result in elevated dissolved methane and a diffusional gradient both below and through the hydrate-bearing sand which we will be able to test with the cores from this site.

As discussed in yesterday's *Daily Operational and Science Report* (from 25-AUG-23), the reason for the lack of sealing in several of the PCTB-CS core tool deployments from yesterday remains uncertain. As suggested in yesterday's report, we were concerned about the possible impact of the small differences between the core tool set boost pressures and the downhole measured/calculated static pressure conditions. In response, **Cores UT-GOM2-2-H002-14CS and -15CS** were ran with their operational boost pressures increased to 5200 and 5500 psi, respectively. However, at this time it does not appear that the changes in the PCTB-CS set pressures had any significant impact on the operation of the pressure coring tools (Table 1).

The Scientific Party is working on finalizing the writing assignments in support of the hole section descriptions in the Expedition Report and processing samples and data that have been collected during the expedition.

There have been no new COVID cases on the *Q4000* in the last twelve days.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

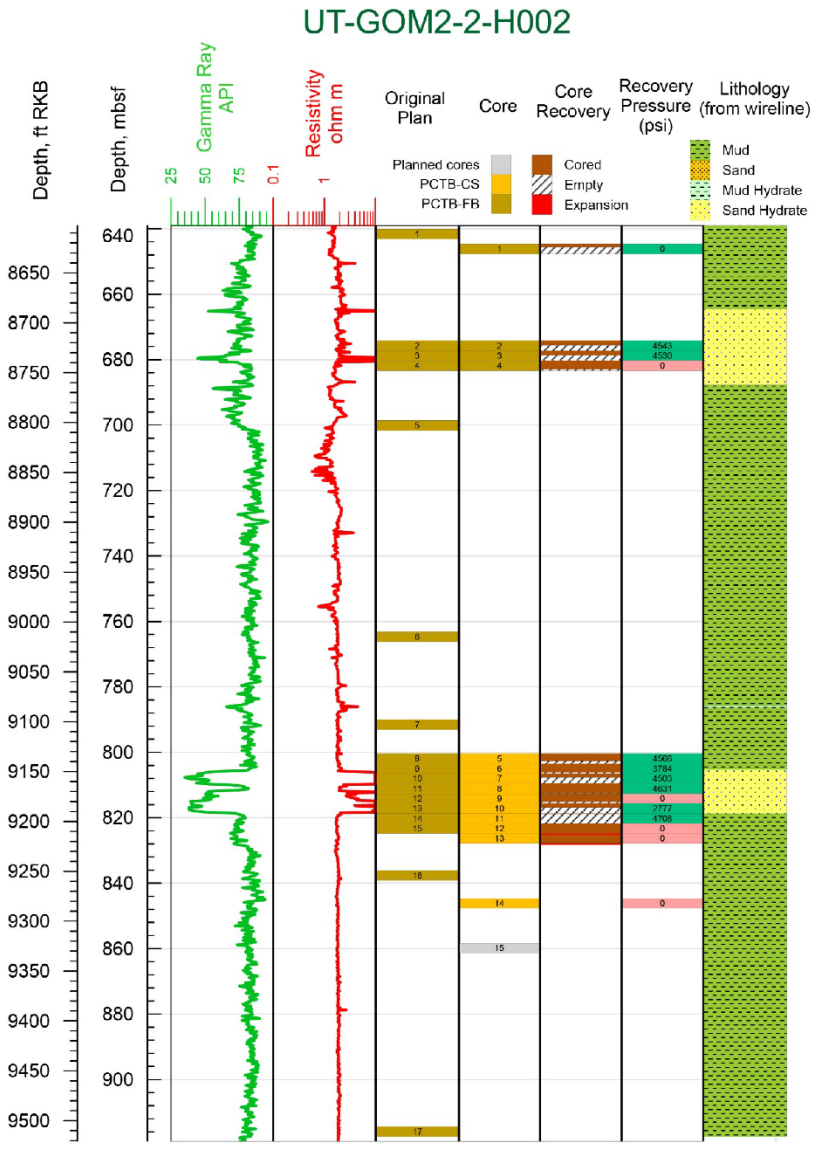

Figure 1: Core recovery plot for the UT-GOM2-2-H002 well as of 24:00 hr 26-AUG-2023. 'PCTB-FB' and 'PCTB-CS' records core recovered by the face bit and cutting shoe versions of the Pressure Coring Tool with Ball (PCTB). Under 'Recovery Pressure', areas colored pink indicate a ball valve that did not seal. At the time of this report, we did not have confirmed information on the status of Cores UT-GOM2-2-H002-14CS and -15CS as reflected in this posting.

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Table 1: PCTB-FB and PCTB-CS pressure core results in Hole UT-GOM2-2-H002 through 26-AUG-2023 (End of Hole).

CORE System	Core Number	Core top (RKB ft)	CORE Top (fbsf)	CORE Bottom (fbsf)	CORE Advance (ft)	Curated length (ft)	Recovery (%)	In situ Pressure (psi)	Tool Boost Set Pressure (psi)	Recovery Pressure (psi)
PCTB-FB	1	8621	2115	2125	10	3.31	33%	3820	4500	0
PCTB-FB	2	8718	2212	2222	10	4.30	43%	3863	4500	4543
PCTB-FB	3	8728	2222	2232	10	4.66	47%	3867	4500	4530
PCTB-FB	4	8738	2232	2242	10	8.63	86%	3872	4500	0
PCTB-CS	5	9132	2626	2636	10	7.61	76%	4047	4500	4566
PCTB-CS	6	9142	2636	2646	10	8.89	89%	4051	4500	3784
PCTB-CS	7	9152	2646	2656	10	3.80	38%	4056	4500	4503
PCTB-CS	8	9162	2656	2666	10	9.81	98%	4060	4500	4631
PCTB-CS	9	9172	2666	2676	10	8.20	82%	4065	4500	0
PCTB-CS	10	9182	2676	2686	10	4.07	41%	4069	4500	2777
PCTB-CS	11	9192	2686	2696	10	0.59	6%	4073	4500	4708
PCTB-CS	12	9202	2696	2706	10	11.38	114%	4078	4500	0
PCTB-CS	13	9212	2706	2716	10	11.29	113%	4082	4500	0
PCTB-CS	14	9277	2771	2781	10	11.29	113%	4111	5200	0
PCTB-CS	15	9322	2816	2826	10	4.10	41%	4131	5500	0

27-August-2023, Core H002-15CS, Cement Liner Stuck in BHA

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 27-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 27-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck. Mud transfer from the *M/V Harvey Spirit.* Derrickman build pad mud and cement spacer. Pit Cleaners cleaning Brine Tanks.

0000-0400 Continue to acquire **Core UT-GOM2-2-H002-15CS** from **Hole UT-GOM2-2-H002**.
0400-0430 Acquire **Core UT-GOM2-2-H002-15CS**, *F/9322 - T/9332 ft RKB* (2816.0-2826.0 fbsf).
0430-0548 POOH PCTB-CS coring tool and transfer to the Geotek Pressure Core Processing Van.
0548-0800 M/U and RIH Geotek Cement Liner BHA. SLB slickline lower cement liner in to BHA noted pressured up to ~500 psi on drill string, shut pumps down then bled pressure to 0 psi. SLB slickline unable to P/U free from cement liner. Company representative and SLB slickline discuss forward plan.
0800-1500 Cycled drill string while SLB slickline attempt to pull free, continued to try to pull the Cement Liner from the BHA.
1500-1530 Laydown one single and cut wireline. R/D TDS wireline packoff and wireline equipment.
1530-1900 POOH drill pipe doubles cutting wireline slip/cut on way out F/9332 to T7017 ft RKB.
1900-2030 About 300 ft below mudline, R/U wireline and wireline equipment, splice wireline into the SLB wireline unit. SLB wireline continue to attempt to remove the Cement Liner from the BHA.
2030-2230 M/U wireline to the bails on the TDS to enable a more straight pull from the hole. Pump seawater through the TDS in an attempt to reduce the mass of the high density mud in the drill pipe. No flow was possible. Repeated attempts to remove the Cement Liner from the BHA were unsuccessful.
2230-2400 POOH drill pipe in doubles cutting wireline slip/cut on way out F/7017 to T/6326 (above seafloor) ft RKB.

4. OPERATIONAL PLAN (Next 24 Hours):
Remove the Cement Liner from the BHA, re-enter **Hole UT-GOM2-2-H002,** RIH PCTB-CS BHA to above the Orange Sand and set a ~300 ft long cement plug.

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5. DOWNHOLE LOGGING OPERATIONS:

Hole: NA

Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:

Hole: Hole UT-GOM2-2-H002

G-APC Coring Totals: NA

G-XCB Coring Totals: NA

PCTB-CS Coring Totals:

Core UT-GOM2-2-H002-15CS*: 4.10 ft (41% recovery), 0 psi. (in core receiving)*
Coring F/ 9322 - T/ 9332 ft RKB at 80 rpm, maintaining 10-12k on bit, CMT pumping 10.5 ppg WBM at 3.0 bpm and 101 psi.

PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Coring operations in **Hole UT-GOM2-2-H002** ended today with the recovery and processing of **Core UT-GOM2-2-H002-15CS** from the depth interval 9322-9332 ft RKB (2816-2826 fbsf), which also marked the total final depth of **Hole UT-GOM2-2-H002** at 9332 ft RKB (2826 fbsf) (Figure 1, Table 1). **Core UT-GOM2-2-H002-14CS and Core UT-GOM2-2-H002-15CS** were also processed today as conventional core and important interstitial-water, microbiological, and headspace geochemistry samples were collected from the core. It is also important to note that Geotek has been acquiring X-ray scans of the conventionalized core using PCATS to help direct the core sub-sampling efforts.

Since 0650 hr today Geotek and the Helix D/V Q4000 rig crew have been dealing with freeing the Geotek Cement Liner BHA and regaining the ability to circulate through the drill bit and pipe. The focus of this effort has been the consideration that we may be dealing with a "pressure lock" that formed at the bottom of the BHA when the Geotek Cement Liner was landed out in the BHA during deployment. As reviewed in the above "4. DESCRIPTION OF OPERATIONS" section of this report, after making a number attempts to pull the Cement Liner from the BHA, the decision was made to cut the wireline connected to the Cement Liner and slip/cut while tripping the BHA back to near the seafloor and to try again to pull the Cement Liner from the BHA, which started near the end of today's reporting period at midnight on 27-AUG-23.

Additional Information from the morning of 28-AUG-23: *Additional attempts to pull the Cement Liner from the BHA at approximately 3000 ft RKB was unsuccessful. The decision was made to pull the BHA back to the ship for further inspection and analysis.*

The Scientific Party is working on finalizing the writing assignments in support of the hole section descriptions in the Expedition Report and processing samples and data that have been collected during the expedition. In addition, the UT Scientific Party have been working with Geotek staff to further develop and refine the operational plans for the post-expedition core processing and analysis efforts to be conducted at the Geotek facilities at Salt Lake City.

There have been no new COVID cases on the *Q4000* in the last thirteen days.

UT-GOM2-2_Daily_Science_Report_08_27_23_Final

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

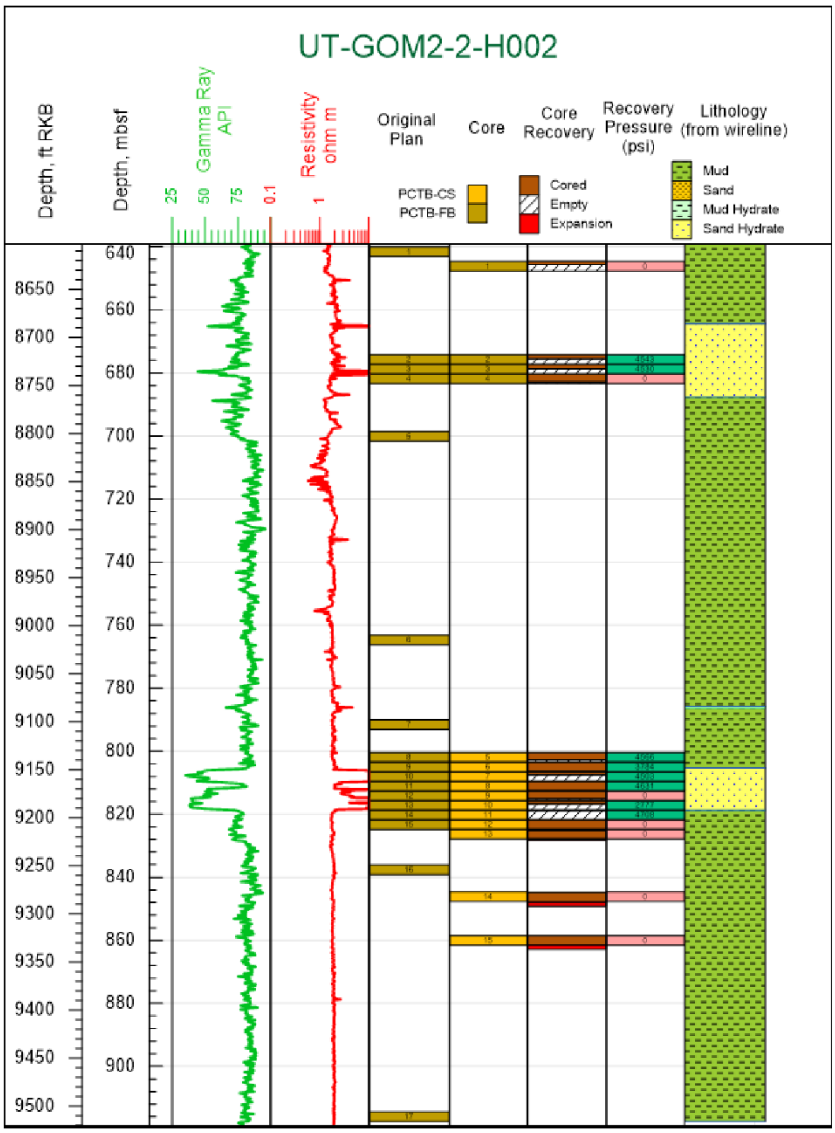

Figure 1: Core recovery plot for the UT-GOM2-2-H002 well as of 24:00 hr 27-AUG-2023. 'PCTB-FB' and 'PCTB-CS' records core recovered by the face bit and cutting shoe versions of the Pressure Coring Tool with Ball (PCTB). Under 'Recovery Pressure', areas colored pink indicate a ball valve that did not seal (End of Hole).

UT-GOM2-2_Daily_Science_Report_08_27_23_Final

Table 1: PCTB-FB and PCTB-CS pressure core results in Hole UT-GOM2-2-H002 through 27-AUG-2023 (End of Hole).

CORE System	Core Number	Core top (RKB ft)	CORE Top (fbsf)	CORE Bottom (fbsf)	CORE Advance (ft)	Curated length (ft)	Recovery (%)	In situ Pressure (psi)	Tool Boost Set Pressure (psi)	Recovery Pressure (psi)
PCTB-FB	1	8621	2115	2125	10	3.31	33%	3820	4500	0
PCTB-FB	2	8718	2212	2222	10	4.30	43%	3863	4500	4543
PCTB-FB	3	8728	2222	2232	10	4.66	47%	3867	4500	4530
PCTB-FB	4	8738	2232	2242	10	8.63	86%	3872	4500	0
PCTB-CS	5	9132	2626	2636	10	7.61	76%	4047	4500	4566
PCTB-CS	6	9142	2636	2646	10	8.89	89%	4051	4500	3784
PCTB-CS	7	9152	2646	2656	10	3.80	38%	4056	4500	4503
PCTB-CS	8	9162	2656	2666	10	9.81	98%	4060	4500	4631
PCTB-CS	9	9172	2666	2676	10	8.20	82%	4065	4500	0
PCTB-CS	10	9182	2676	2686	10	4.07	41%	4069	4500	2777
PCTB-CS	11	9192	2686	2696	10	0.59	6%	4073	4500	4708
PCTB-CS	12	9202	2696	2706	10	11.38	114%	4078	4500	0
PCTB-CS	13	9212	2706	2716	10	11.29	113%	4082	4500	0
PCTB-CS	14	9277	2771	2781	10	11.29	113%	4111	5200	0
PCTB-CS	15	9322	2816	2826	10	4.10	41%	4131	5500	0

28-August-2023, Pull out of Hole, Re-enter Hole,

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 28-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 28-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck. Mud transfer from the *M/V Harvey Spirit*.

0000-0500 Continue to pull out of **Hole UT-GOM2-2-H002** in double lengths of drill pipe while cutting wireline (slip/cut) F/6326 to T/3000 ft RKB.
0500-0630 RIH SLB slickline and hang off the wireline below TDS. Attempt to pull out Geotek Cement Liner. SLB Slickline could not pull cement liner out of BHA, decision was made to rig down slickline then continue to POOH.
0630-1200 POOH drill pipe doubles cutting wireline (slip/cut) on way out F/3000 ft RKB to surface. L/D BHA noted SLB slickline was stuck inside drill collar.
1200-1330 Continue to POOH L/D Seal Bore Assembly and Cement Liner core barrel.
1330-2200 P/U new Cementing BHA assembly RIH to 6505 ft RKB.
2200-2230 M/U top drive to fill pipe while ROV and *Helix D/V Q4000* Bridge made various moves to put BHA over **Hole UT-GOM2-2-H002**.
2230-2400 After re-entering **Hole UT-GOM2-2-H002** without any problems, RIH washing F/6505 to T/6917 ft RKB.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue running into **Hole UT-GOM2-2-H002,** RIH Cementing BHA assembly to above the Orange Sand and set a ~300 ft long cement plug.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA

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PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES
The onboard science party completed the last shipboard sampling of two remaining **PCTB-CS** acquired core sections (**Cores UT-GOM2-2-H002-05CS and -08CS)** that had been processed through PCATS and quantitively degassed to calculate the volume of gas hydrate or concentration of dissolved methane within each of the core samples. The same two samples were also sub-sampled in the Geotek conventional core processing laboratory to acquire the standard set of interstitial-water, microbiological, and headspace geochemistry samples. Geotek also acquired today the last shipboard LN2 frozen (cryogenic) microbiological core samples from **Core UT-GOM2-2-H002-05CS and Core UT-GOM2-2-H002-11CS.** The Scientific Party also continued to work with Geotek staff to further develop and refine the operational plans for the post-expedition core processing and analysis efforts to be conducted at the Geotek facilities at Salt Lake City.

Work also continued until about 1330 hr to remove the Geotek Cement Liner from the coring BHA, which had become stuck on 27-Aug-23. After numerous failed attempts to remove the Cement Liner from the BHA, the decision was made yesterday to trip the stuck Cement Liner and BHA out of the hole. Several additional attempts to pull the Cement Liner from the BHA at approximately 3000 ft RKB were also unsuccessful. Upon the recovery of the BHA to the vessel, it was discovered that the running tool on the SLB slickline was stuck inside the drill collars on the BHA. By 2230 hr, a new Cementing BHA had been M/U and RIH to the seabed where, because of extensive planning by the UT Drilling Staff and the *Helix D/V Q4000* operational crew, the BHA entered the seafloor and was RIH to 411 fbsf by midnight.

The completion of the shipboard processing of the PCTB-FB- and PCTB-CS-acquired pressure cores from the **Hole UT-GOM2-2-H002** provided the shipboard scientific party with the opportunity to further examine to results of the *Orange Sand Coring Campaign* that was conducted from 24-AUG-23 through 25-AUG-23. The *Orange Sand Coring Campaign* included the acquisition of nine PCTB-CS pressure cores (**Core UT-GOM2-2-H002-05CS** through **Core UT-GOM2-2-H002-13CS)** over the depth interval from 9132 ft RKM to 9222 ft RKB (2626-2716 fbsf). As shown in Figure 1, six of the nine PCTB-CS deployments were recovered near their pre-set boost pressures. The percent of core recovery in this section of the hole was greater than 76% for six of the deployments and dropped to 38-41% for two of the cores, with one core yielding only about 6 inches of core.

The well data (Gamma-Ray, Bulk Density, and Resistivity logs) shown in Figure 1 was obtained in 2009 from **Hole WR313 H001** as drilled during the JIP Leg II Expedition. The far righthand column in this display depicts the actual depth from which the cores were obtained in **Hole UT-GOM2-2-H002.** The second column from the right in Figure 1, depicts the shipboard science party derived depth correlations between **Hole WR313 H001** log data and the **Hole UT-GOM2-2-H002** acquired cores. The PCATS acquired Gamma-Density, P-Wave Velocity, and X-Ray scans for five of the pressure cores (Figures 2a-e) obtained from this sequence were used to help make the "Preliminary Core-Log Correlations" depicted in Figure 1. The PCATS scans of **Cores UT-GOM2-2-H002-05CS through -6CS** (Figures 2a-2b) appear to be contain mostly mud-rich sediments with numerous thin hydrate-bearing sand beds; the well log data from this interval also suggests the presence of thin hydrate-bearing sand beds in the same section of the hole. **Core UT-GOM2-2-H002-07CS** (Figure 2c) is an important core in that it appears to have penetrated the top of thick hydrate-bearing likely silt-sand interval. This contact likely correlates the top

of log inferred gas hydrate occurrence at a depth of ~9161 ft RKB in **Hole UT-GOM2-2-H002** (Figure 1). It is important to note that **Core UT-GOM2-2-H002-07CS** is missing ~6.2 ft (~1.9 m) of sediment, which would have likely been hydrate-bearing sediment as shown in Figure 1 that may have "jammed" and was "milled" during coring. **Core UT-GOM2-2-H002-08CS** (Figure 2d) is another important core acquired from the Orange Sand in that it appears to contain an upper and a lower prominent hydrate-bearing silt-sand units that straddles a mostly mud-rich section; this same relationship is inferred in the log data as depicted in Figure-2. **Core UT-GOM2-2-H002-09CS** was not recovered under pressure; therefore, we do not have any PCATS scans from this core. However, upon visual inspection of this conventionalized core in the Geotek Core Receiving Lab, it was determined to be mostly mud-rich with several possible former hydrate-bearing silt-sand beds that may have dissociated upon recovery, which would again closely match the well log inferred geologic characteristics of this section in the hole. The PCATS scans of **Core UT-GOM2-2-H002-010CS** (Figure 2c) indicate that the upper 65 cm (2.1 ft) of this core likely contains several hydrate-bearing silt-sand intervals, while the lower 65 cm (2.1 ft) of the recovered core section appears to be mostly mud-rich. The well log section that appears to correlate to the **Core UT-GOM2-2-H002-010CS** also exhibits the presence of similar hydrate-bearing silt-sand intervals overlying a relatively thin mud-rich. It is important to note that the lower 176 cm (5.8 ft) of **Core UT-GOM2-2-H002-010CS** is missing, which according to the log data from this interval indicates that this missing section may have contain a hydrate-bearing silt-sand interval.

It is again important to highlight that the suggested core-log correlations as reviewed in this report are highly preliminary and will be the focus of extensive additional and much more advance examination during the post-expedition laboratory studies in Salt Lake City. The analysis presented in this report, suggest that most of the Orange Sand section was cored and recovered during the expedition. In addition, several of the more significant gas hydrate-bearing sections were successfully cored and stored for later intensive laboratory studies. At the same time, however, we also acknowledge that it appears that we failed to recover several prominent hydrate-bearing sections.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

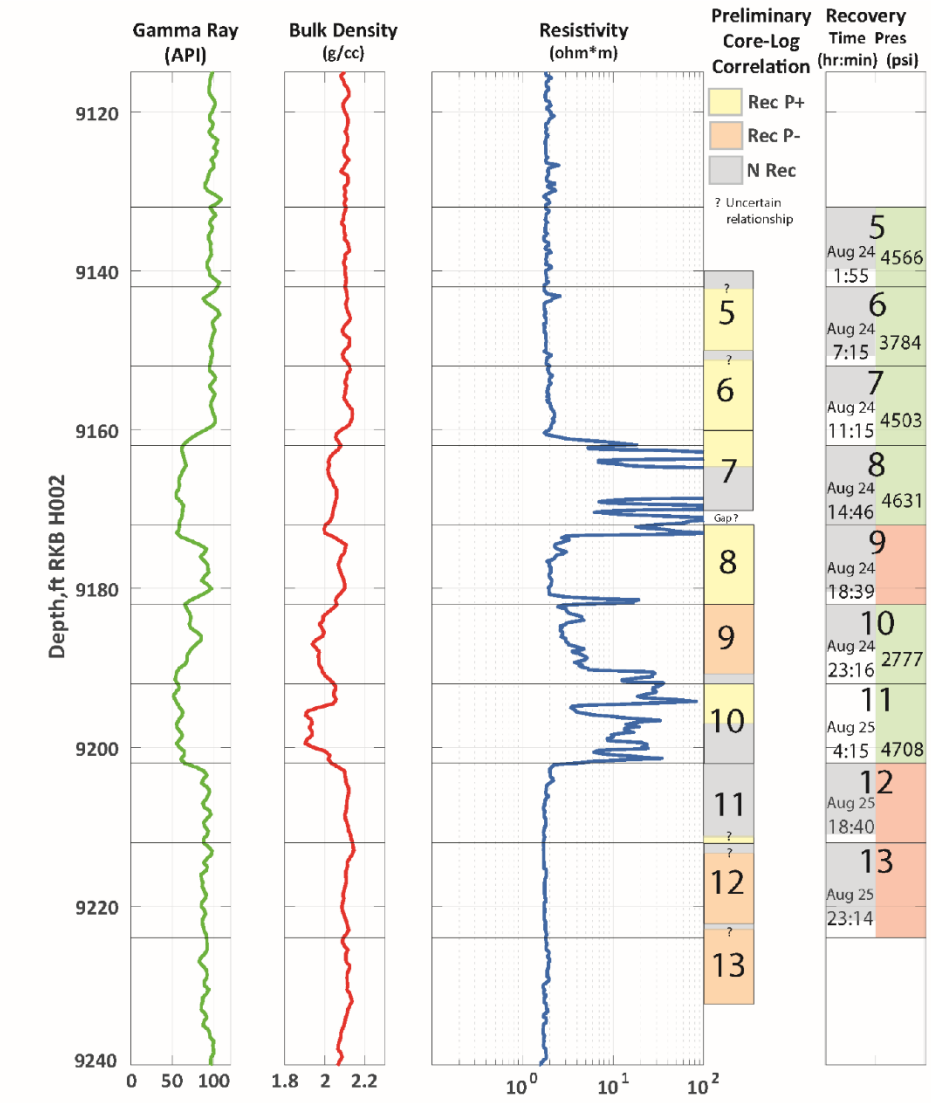

*Figure 1: Preliminary depth correlations between **Hole WR313 H001** log data and the **Hole UT-GOM2-2-H002** acquired cores. See text in this report for additional information on the depicted log-core correlations.*

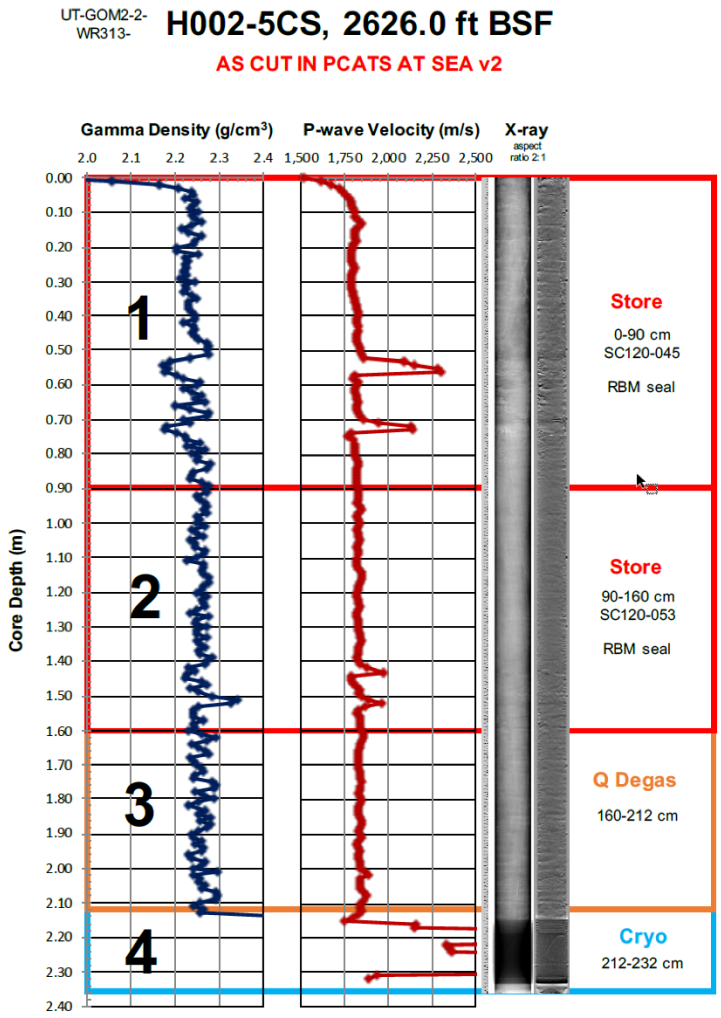

Figure 2a: X-ray, P-wave velocity, and density scans of Core UT-GOM2-2-H002-05CS as acquired from the Geotek Pressure Core Analysis and Transfer System (PCATS). Also shown is the position of the core cuts made in PCATS (As Cut Core in PCATS) along with how the cut core sections were distributed for future analysis and storage.

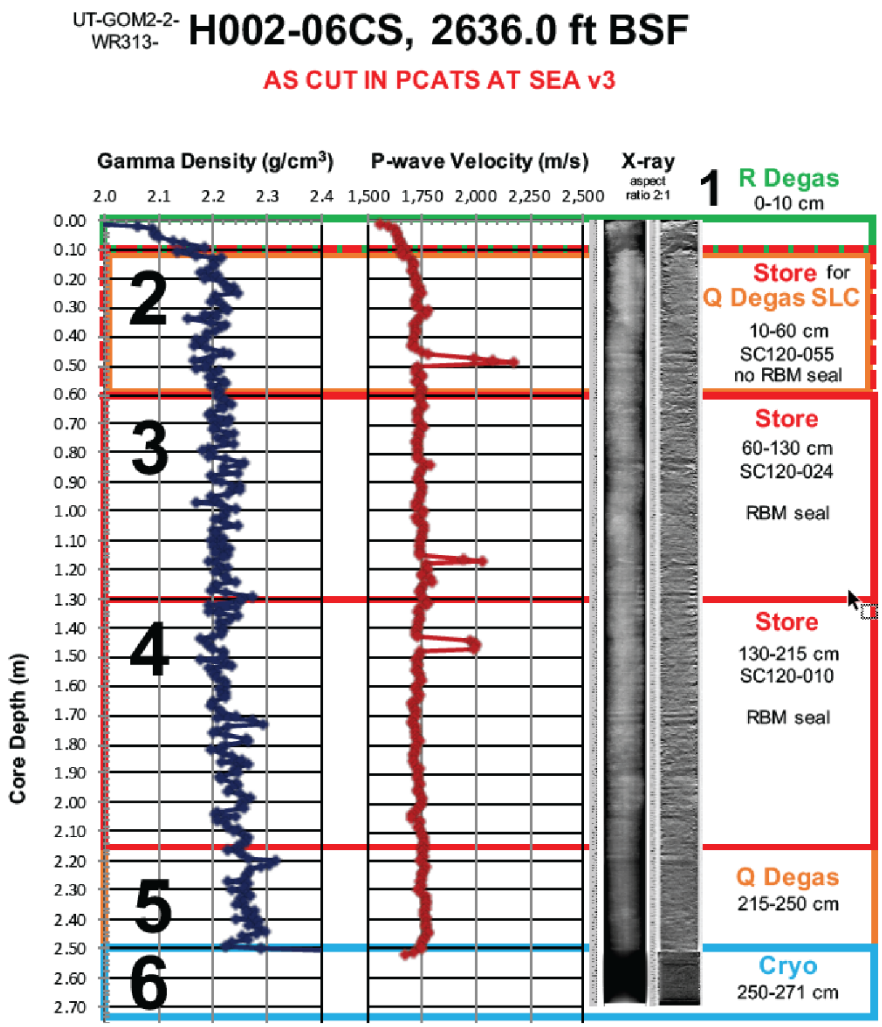

Figure 2b: X-ray, P-wave velocity, and density scans of Core UT-GOM2-2-H002-06CS as acquired from the Geotek Pressure Core Analysis and Transfer System (PCATS). Also shown is the position of the core cuts made in PCATS (As Cut Core in PCATS) along with how the cut core sections were distributed for future analysis and storage.

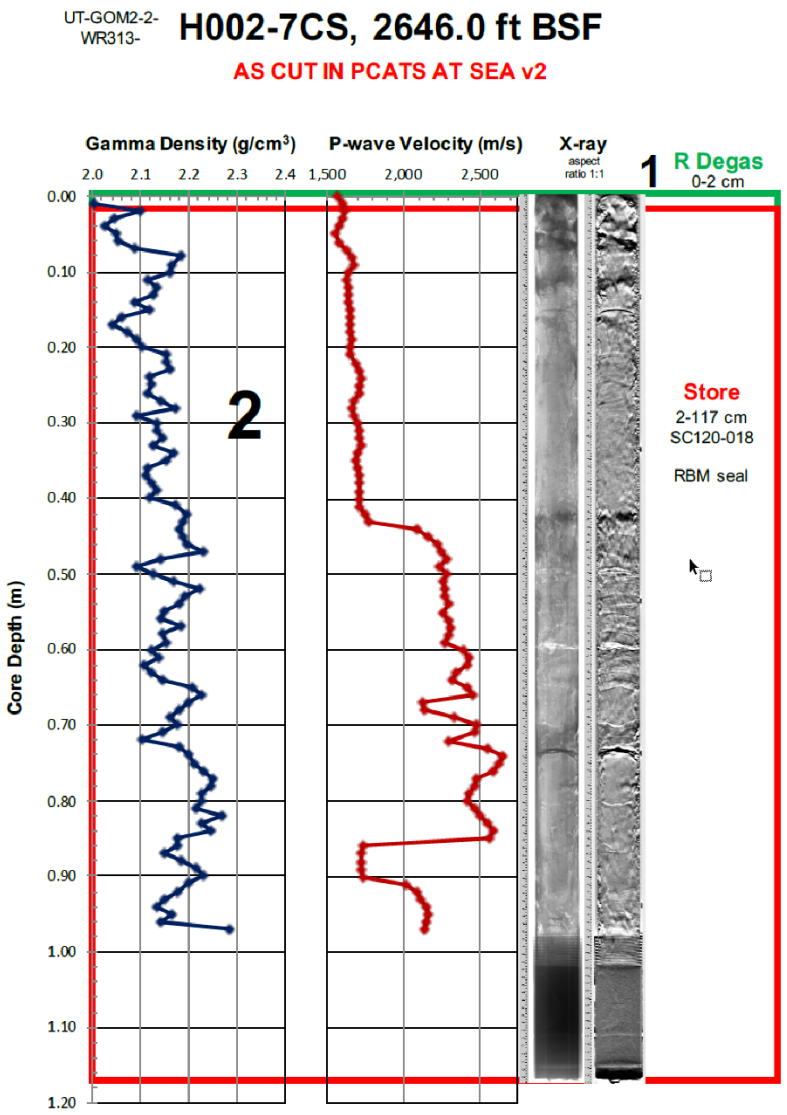

Figure 2c: X-ray, P-wave velocity, and density scans of Core UT-GOM2-2-H002-07CS as acquired from the Geotek Pressure Core Analysis and Transfer System (PCATS). Also shown is the position of the core cuts made in PCATS (As Cut Core in PCATS) along with how the cut core sections were distributed for future analysis and storage.

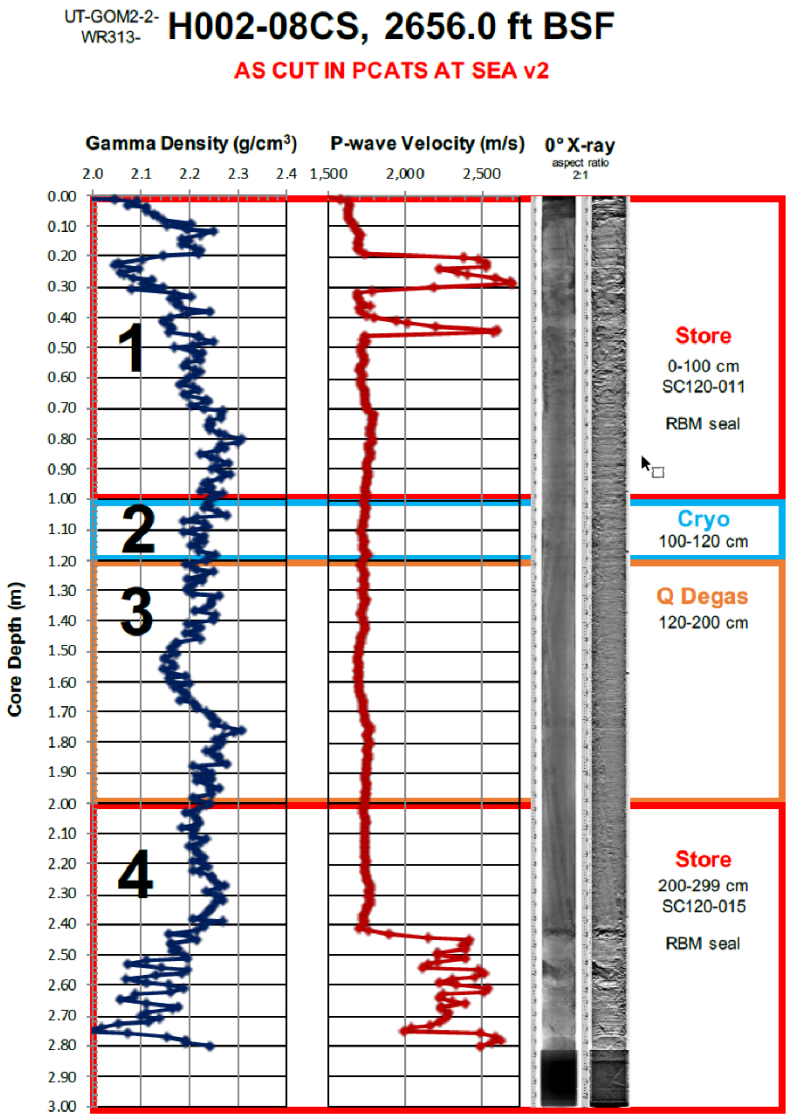

Figure 2d: X-ray, P-wave velocity, and density scans of Core UT-GOM2-2-H002-08CS as acquired from the Geotek Pressure Core Analysis and Transfer System (PCATS). Also shown is the position of the core cuts made in PCATS (As Cut Core in PCATS) along with how the cut core sections were distributed for future analysis and storage.

UT-GOM2-2_Daily_Science_Report_08_28_23 _Final

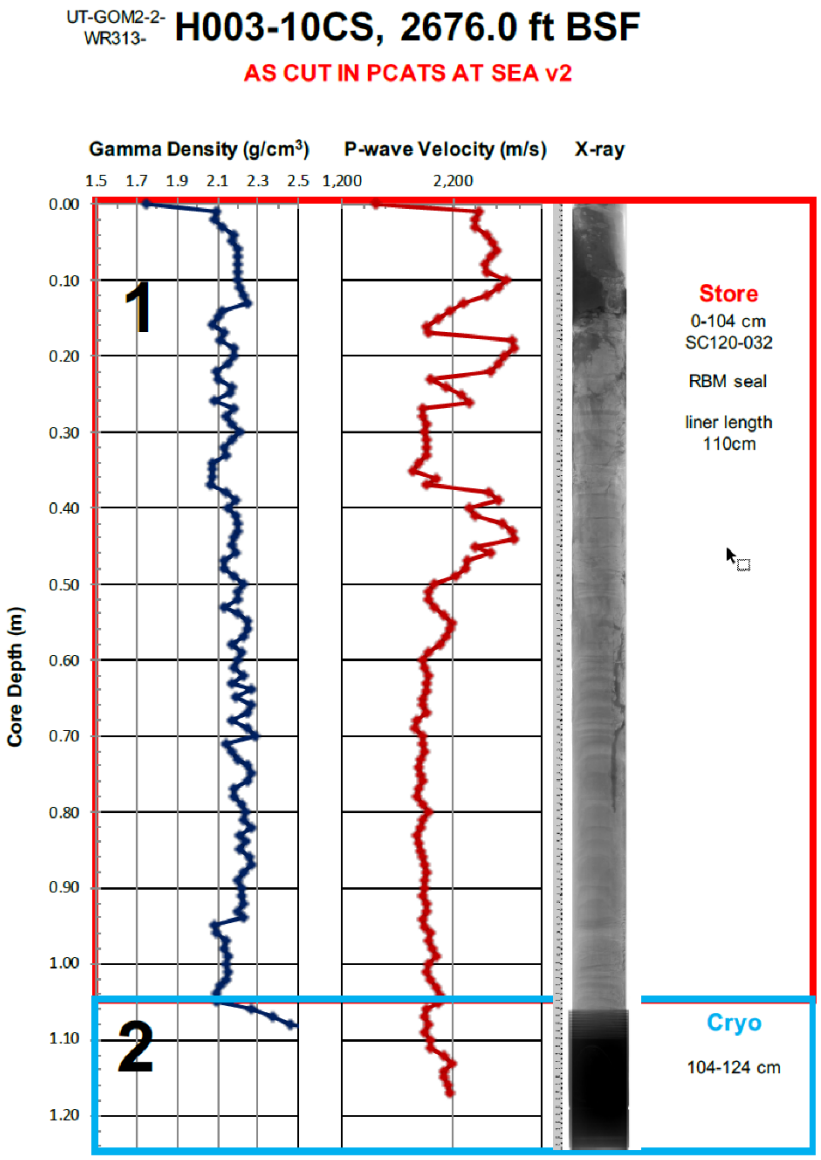

Figure 2e: X-ray, P-wave velocity, and density scans of Core UT-GOM2-2-H002-10CS as acquired from the Geotek Pressure Core Analysis and Transfer System (PCATS). Also shown is the position of the core cuts made in PCATS (As Cut Core in PCATS) along with how the cut core sections were distributed for future analysis and storage.

UT-GOM2-2_Daily_Science_Report_08_28_23 _Final

29-August-2023, Place Cement, Wait on Cement

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 29-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 29-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

General Operations/Maintenance: General housekeeping on weather deck. Transferred 16.0 ppg WBM from *M/V Harvey Spirit* to surface pits and brine tanks.

0000-0640 Continuing running into **Hole UT-GOM2-2-H002** with doubles of 5-7/8" drill pipe F/6917 to T/9332 ft RKB.
0640-0730 Spotted 105 bbls of 11.5 ppg pad mud from F/9332 to T/8548 ft RKB followed by 209 bbls of 10.5 ppg WBM.
0730-0900 POOH from F/9332 to T/8548 L/O singles of 5-7/8" drill pipe.
0900-1230 Prepare for borehole cementing operations. M/U cement stand to the drill string. MU cementer and pump 5 bbl WBM spacer of 10.5 ppg and a second 36.3 bbl WBM spacer of 10.5 ppg. Cementer shut down pumps and cleaned unit.
1230-1315 Mix and pump 71 bbls (369 sks) 16.4 ppg Class H Cement w/ 0.05 gps D047 Antifoam, 0.30 gps D500 Gas Agent, 0.05 gps D230 Dispersant, 0.25 gps D186 Accelerator, Yld 1:08, FT# 398.6ft^3.
1315-1400 Pump 8.7 bbls of tail spacer followed by 5 bbls of seawater. Align Hex Pump and place 6 bpm seawater total pumped 193 bbls. **Cement in place at 14:00 hr. Wait on cement for 24 hrs.**
1400-2400 Laid down Cement Head on deck. POOH F/8548 to T/8048 ft RKB in doubles. Install 2 nerf balls into drill string to clean drill pipe, pump 11 ppg WBM.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue waiting on cement until about 1400 hr on 30-AUG-23. POOH to seafloor while filling the hole with heavy mud.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

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6. CORE OPERATIONS AND DATA:

Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS

Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

With the completion of the onboard acquisition and initial processing of both the conventional cores and pressure cores we would like to take this opportunity review the "as drilled and cored" status of **Hole UT-GOM2-2-H002** (Figure 1, Tables 1 and 2) and **Hole UT-GOM2-2-H003** (Figure 2, Tables 1 and 2). We also summarize in this report, the results of both the conventional and pressure coring operations as conducted under the **UT-GOM2-2 Expedition.** Next, we review the inventory and planned distribution of the pressure cores and associated samples that have been acquired during the **UT-GOM2-2 Expedition.** We end the report with a brief look forward to the shore based core processing efforts that will be conducted at the Geotek Facilities in Salt Lake City.

As established in the Prospectus for the **UT-GOM2-2 Expedition**, the goal of this endeavor is to conduct scientific drilling and coring operations in the Terrebonne Basin of outer continental shelf of the Gulf of Mexico. Through the combination of pressure coring and conventional coring, the expedition has provided critical new data and geologic samples to further our understanding the physical, chemical, and biological properties of the hydrate-bearing sediments and to better understand their role as an integral part of numerous natural system processes.

The first of two holes established during the **UT-GOM2-2 Expedition** was Hole UT-GOM2-2-H003. Operations at the location of **Hole UT-GOM2-2-H003** began at 1223 hr on 04-AUG-23 with the acquisition of the **Core UT-GOM2-2-H003-01H**. The first three piston cores acquired in this hole were intensively sampled in order to further characterize the geochemical and biological processes dominating the near-surface marine system. Ultimately, **Hole UT-GOM2-2-H003** was drilled and cored to a total depth of 7480 ft RKB with the acquisition of 19 conventional and 10 pressure cores (Table 1). Operations at the location of the second hole to be established during this expedition started on the 17-AUG-23 with the spudding of **Hole UT-GOM2-2-H002** at a water depth 6506 ft RKB and the drilling onto the first PCTB-FB core point at 8606 ft RKB and the acquisition of **Core UT-GOM2-2-H003-01FB**. **Hole UT-GOM2-2-H002** was drilled and cored to a total depth of 9332 ft RKB with the acquisition of 15 pressure cores (Table 1).

Table 1: PCTB-CS/PCTB-FB pressure core and G-APC/G-XCB conventional core system performance in Holes UT-GOM2-2-H002 and -H003.

Type of Core	Number of Deployments	Total Penetration (m)	Core Totals (m)	Percent Revovery (%)
H002 Total Core	**15**	**46.0**	**32.0**	**70**
H002 PCTB-CS	11	33.5	25.6	**77**
H002 PCTB-FB	4	12.2	6.4	**52**
H003 Total Core	**29**	**171.0**	**193.9**	**113**
H003 PCTB-CS	10	30.5	22.8	**75**
H003 PCTB-FB	0	0	0	NA
H003 G-APC	18	133.0	162.6	**122**
H003 G-XCB	1	8.5	8.5	**100**

Table 2: Listing of PCTB-CS/PCTB-FB pressure cores and G-APC/G-XCB conventional cores as acquired in Holes UT-GOM2-2-H002 and -H003.

WR313 H003	Core No.	Core Type	Depth Top (fbsf)	Core Curated (m)
WR313 H003	1	H	0	7.69
WR313 H003	2	H	27	10.05
WR313 H003	3	H	61	10.22
WR313 H003	4	CS	89	3.25
WR313 H003	5	CS	99	2.29
WR313 H003	6	H	106	10.42
WR313 H003	7	H	129	8.47
WR313 H003	8	CS	153	2.46
WR313 H003	9	H	163	8.92
WR313 H003	10	H	186	8.3
WR313 H003	11	H	209	9.24
WR313 H003	12	H	232	9.23
WR313 H003	13	CS	255	0.42
WR313 H003	14	H	265	9.42
WR313 H003	15	CS	290	0.9
WR313 H003	16	H	300	8.2
WR313 H003	17	H	321	8.63
WR313 H003	18	H	342	9.58
WR313 H003	19	CS	364	3.46
WR313 H003	20	H	374	9.03
WR313 H003	21	H	399	8.64
WR313 H003	22	H	424	7.25
WR313 H003	23	H	449	8.84
WR313 H003	24	CS	474	3.46
WR313 H003	25	H	484	10.46
WR313 H003	26	X	914	8.51
WR313 H003	27	CS	942	3.21
WR313 H003	28	CS	954	0.75
WR313 H003	29	CS	964	2.61
WR313 H002	1	FB	2115	1.01
WR313 H002	2	FB	2212	1.31
WR313 H002	3	FB	2222	1.42
WR313 H002	4	FB	2232	2.63
WR313 H002	5	CS	9132	2.32
WR313 H002	6	CS	9142	2.7
WR313 H002	7	CS	9152	1.17
WR313 H002	8	CS	9162	2.99
WR313 H002	9	CS	9172	3.42
WR313 H002	10	CS	9182	1.24
WR313 H002	11	CS	9192	0.18
WR313 H002	12	CS	9202	3.47
WR313 H002	13	CS	9212	3.44
WR313 H002	14	CS	9277	3.44
WR313 H002	15	CS	9322	1.25

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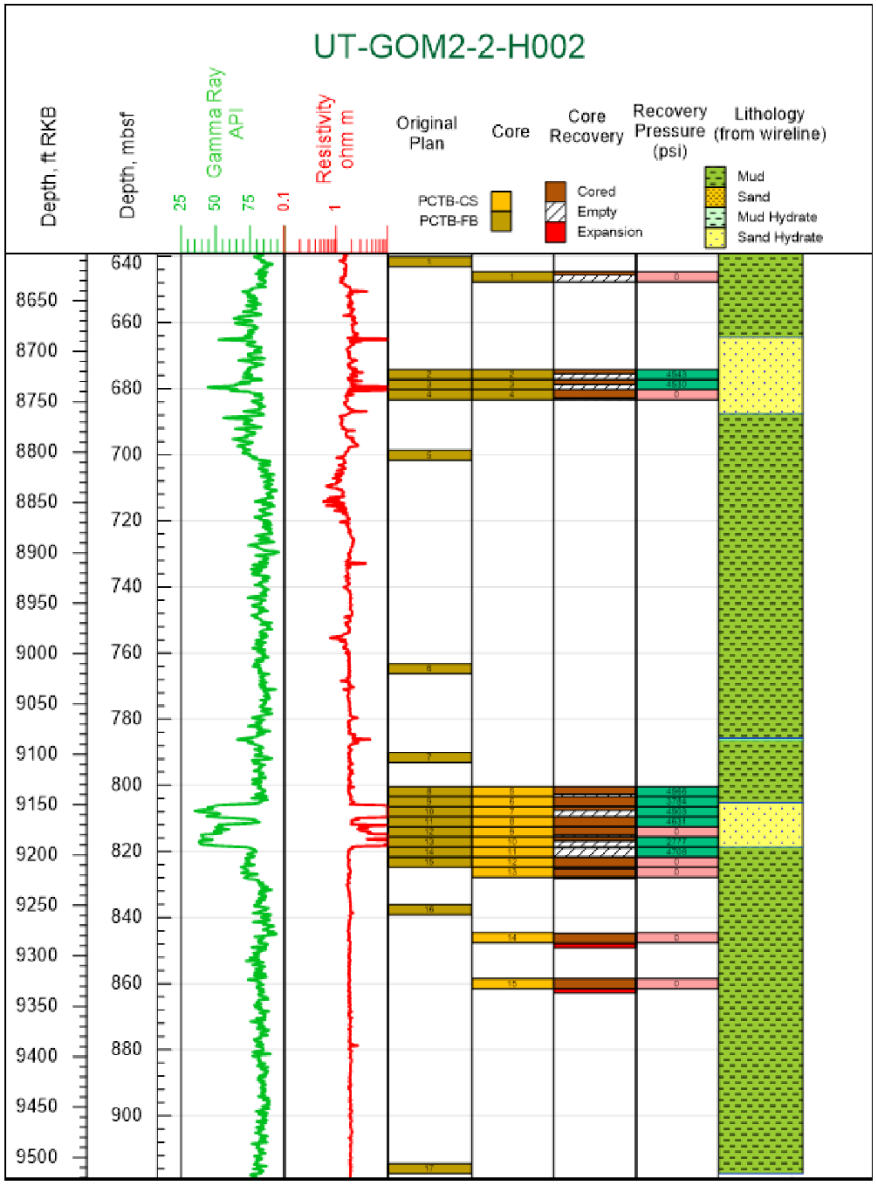

Figure 1: Core recovery plot for the UT-GOM2-2-H002 well as of 24:00 hr 25-AUG-2023 (End of Well). 'PCTB-CS' and 'PCTB-FB' records core recovered by the cutting shoe and face bit versions of the Pressure Coring Tool with Ball (PCTB).

UT-GOM2-2_Daily_Science_Report_08_29_23_Final

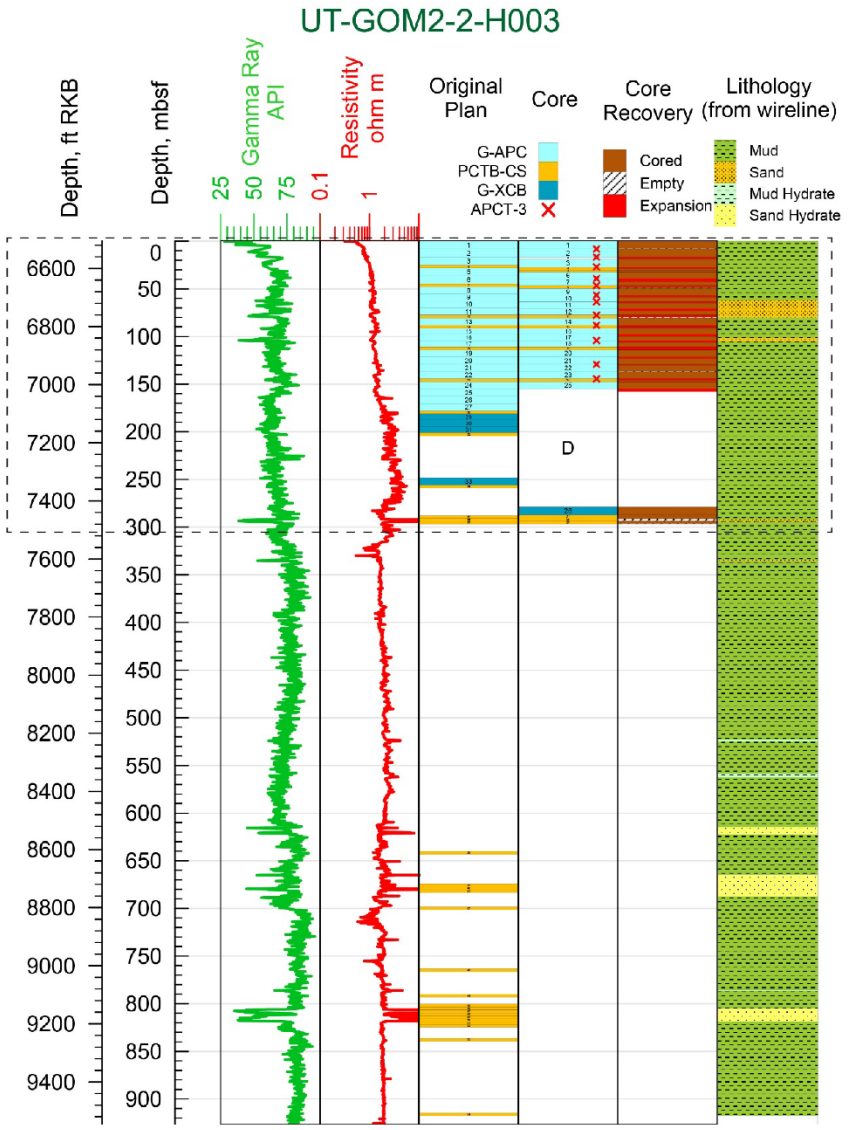

Figure 2: Core recovery plot for the UT-GOM2-2-H003 well as of 24:00 hr 16-AUG-2023 (End of Well). 'G-APC' records core recovered by the Geotek Advanced Piston Corer. 'G-XCB' records core recovered by the Geotech cutting shoe coring cool. 'PCTB-CS' records core recovered by the cutting shoe version of the Pressure Coring Tool with Ball (PCTB). 'APCT-3' records the location where temperatures were measured with a specially instrumented coring shoe.

UT-GOM2-2_Daily_Science_Report_08_29_23_Final

A critical part of the science program in support of the goals of the expedition was the processing and subsampling of the recovered conventional G-APC and G-XCB acquired cores and equally important the conventionalized PCTB-CS and PCTB-FB pressure cores. The standard set of conventional core subsamples involve the acquisition of a long list of samples (Table 3), including Void Gas (VG/VOID), Cell Count (CEL), Headspace Gas Samples (HS), Microbiological (MB), Interstitial Water (IWO and IWR), Moisture/Density (MDW), Geomechanical (GEOM), and Palaeontologic (PAL) samples. The processing of each conventional core also included the making strength measurements on the end of each core section with Pocket Penatromter (PEN) and Vane Shear (VANE) devices.

Table 3: List of subsamples obtained from the conventional cores and conventionalized. pressure cores as acquired in Holes UT-GOM2-2-H002 and -H003.

WRC Samples	Sample Code	Sample Count
Paleontology	PAL	32
Cell Count	CEL	46
Headspace	HS	53
Void Gas	VG/VOID	36
Interstitial Water - Organic	IWO	45
Interstitial Water - Regular	IWR	70
Microbiology	MB	67
Moisture/Density	MDW	(58) TBD
Geomechanical	GEOM	(53) TBD
Measurements		
Pocket Penetrometer	PEN	309
Vane Shear	VANE	105

With the expected completion of the at-sea part of the **UT-GOM2-2 Expedition** in the next several days, our attention has now turned to the demobilization of the UT-Austin and Geotek coring equipment and associated core processing laboratories from the *Helix D/V Q4000* and onto the Geotek facilities in Salt Lake City, Utah where the traditional "dockside" operations will focus on completing the primary analysis of the recovered core and the shipping of samples to various institutions for additional detailed analysis.

Table 4 included in this report contains a complete compilation of all the PCTB-CS and PCTB-FB pressure cores attempted and recovered during the **UT-GOM2-2 Expedition,** including their status (recovery pressure) upon recovery and the total length of recovered core. Table 4 also documents what types of PCATS scans have been completed on each core and if DST (pressure & temperature) data was obtained from each core run. This compilation also captures if a particular core section has been "stored" for future analysis, cryo (LN2) frozen, quantitatively degassed, or rapidly degassed.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

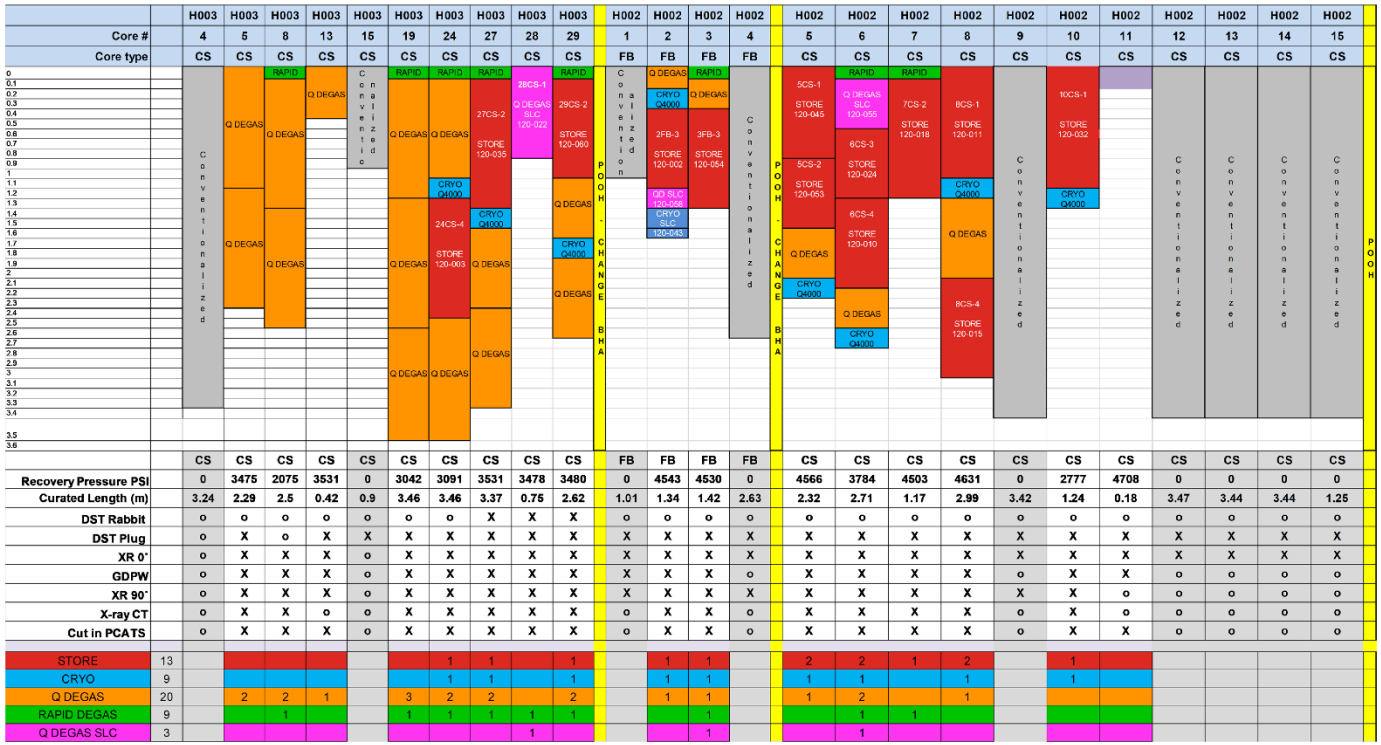

*Table 4: Compilation of the PCTB-CS and PCTB-FB pressure cores acquired during the **UT-GOM2-2 Expedition** along with description of the processing history of each core (see the text in this report for additional information).*

30-August-2023, Wait on Cement, Tag Cement

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 30-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 30-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002

0000-1400 Continuing "waiting on cement" in **Hole UT-GOM2-2-H002.**
Other concurrent activities:
- General housekeeping on weather deck pressure washing on the top drive and rig floor.
- Cleaning of Brine Tanks.
- Prepare Geotek equipment in preparation for backloading.
- Removing slickline "hang-off" sheave from the TDS dolly.
- Cleaning cement Silo #1.

1400-1415 RIH F/8048 to 8105 ft RKB and tagged top of cement plug w/15k bit weight.
1415-1730 POOH 5-7/8 inch DP in singles F/8105 to 6352 ft RKB.
1730-1930 Pump seawater to flush Hex pump #1 & 2 and string clean of drilling mud.
1930-2400 **Vessel on Lump Sum Demobilization.** Continue to POOH DP 5-7/8 inch DP in singles F/6352 to T/3400 ft RGB.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue POOH 5-7/8 inch DP and BHA. Demobilize from the *Helix D/V Q4000* to the *Harvey Hermes Service Vessel* the remaining UT and Geotek laboratories, coring equipment, and personnel.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

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7. DOWNHOLE MEASUREMENTS

Hole: NA

Pressure and Temperature Tool Deployment (T2P): NA

Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

Work has continued today to breakdown and pack the remaining UT and Geotek labs and offices on the *Helix D/V Q4000*. Special care is being taken to maintain power to the containers with thermally sensitive core samples. Demobilize of equipment from the *Helix D/V Q4000* to the *Harvey Hermes Service Vessel* has also stated and expected to continue to the expected departure of the *Harvey Hermes* from Walker Ridge on the afternoon of 31-AUG-23.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

31-August-2023, Demobilization

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 31-August-2023, 0000-2400hr

2. LOCATION:
2400 hr, 31-August-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-2400 At Hole UT-GOM2-2-H002 on Lump Sum Demobilization

0000-0400 Pulled drill string in singles. Brought on deck drill collars and Geotek Bottom Hole Assembly.
0400-2400 Proceeded with general demobilization

- 1500 hours MV Harvey Hermes departed with all remaining UT Project Equipment
- Continue cleaning mud pits.
- Notified BSSE of rig move at 12:55.
- Rack back Top Drive System.

4. OPERATIONAL PLAN (Next 24 Hours):
Continue Lump Sum demobilization

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES

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Work continue to offload UT and Geotek labs and offices on the *Helix D/V Q4000*. Special care is being taken to maintain power to the containers with thermally sensitive core samples. All UT personnel except company man Thomas Redd departed with the *Harvey Hermes* from Walker Ridge at 1500 hours.

9. ACRONYMS

bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

1-September-2023, Demobilization, Off Location

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATE: 01-September-2023, 0000-2400hr

2. LOCATION:
2400 hr, 01-September-2023
Hole: *Helix D/V Q4000* was located over Hole UT-GOM2-2-H002 until moving 1 mile off location at end of day

Last Drill/Core depth: 9332 ft MD RKB

RKB to Mud line: 6506 ft on Drill pipe measurements
Water depth: 6454 ft
Per Datum: 52 ft
Lat 26°39'44.2229"N, Long 091°40'33.8972"W NAD27 BLM15 Feet

3. DESCRIPTION OF OPERATIONS:

0000-22:30 Demobilization
- General house keeping
- Washing moon pool
- Cleaning mud pits

22:30: Began moving vessel one mile off location
24:00: Vessel 1 mile off location. End of lump sum demobilization and UT Project

4. OPERATIONAL PLAN (Next 24 Hours):
Project ended.

5. DOWNHOLE LOGGING OPERATIONS:
Hole: NA
Wireline Totals (directional): NA

6. CORE OPERATIONS AND DATA:
Hole: NA
G-APC Coring Totals: NA
G-XCB Coring Totals: NA
PCTB-CS Coring Totals: NA
PCTB-FB Coring Totals: NA

7. DOWNHOLE MEASUREMENTS
Hole: NA
Pressure and Temperature Tool Deployment (T2P): NA
Temperature Tool Deployment (APCT-3): NA

8. SCIENCE ACTIVITES
None

9. ACRONYMS

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bpm	Barrels per minute
Fish	The object to be recovered from the borehole/BHA
gpm	Gallons per minute
M/U	Make up
PCATS	Pressure Core Analysis and Transfer System
PCTB-CS	Pressure coring tool with ball-cutting shoe version.
POOH	Pull out of hole
psi	Pounds per square inch
P/U	Pick up
RIH	Run in hole
RKB	Depth measured from the rig floor
rpm	Revolutions per minute
R/U	Rig up
SLB	Schlumberger
Slickline	Wireline used to deploy and recover core, etc.
TD	Total depth
TDS	Top drive system
WOB	Weight on bit

2-September-2023 to 17-September-2023, Remobilization in SLC

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATES: 02-September-2023 to 17-September-2023

2. DESCRIPTION OF OPERATIONS: The Journey continues after departing the Q-4000! Many scientists got a few days off (or time to catch up on other duties) during this period. However, Geotek continued their 24-7 efforts to make this expedition a success. Conventional core was scanned in College Station and shipped to Salt Lake City (SLC). Some pressure cores were delivered to UT Austin and others were delivered to SLC. Preparations were made at Geotek's SLC facility for core analysis that will begin on Sept. 18. Details are below.

- The Q4000 was handed over at midnight on Sept. 1, 2023 (see daily report for 01-September 2023)
- Peter Flemings (UT) and Tim Collett (USGS) flew home on Sept. 1 after hitching a ride on the Harvey Hermes.
- On Sept 1., the Geotek team offloaded containers and other equipment from the Harvey Hermes to the Harvey Gulf port. Three containers with cores and samples were powered at the port.
- Steve Phillips (USGS) delivered microbiology subsamples to Caleb Boyd from Brandi Kiel Reese's laboratory for single cell genome analysis (microbiology), arranged for samples to be shipped to the University of Chicago for analysis of heterotrophic microorganisms, shipped fresh samples to Oregon State, shipped gas samples to Austin where they will be further shipped to USGS labs in Woods Hole. Phillips flew home on Sept. 4 with biostratigraphy samples which were used to produce a preliminary age model (see below).
- From Sept. 4-7 September Geotek shipped 8 container units, the heavy van, and tubulars to Salt Lake City
- From Sept. 4-8 conventional core was transported by Geotek Coring to College station for conventional core logging ((MSCL-S and XCT) initiated).
- Sept. 8: Port Fourchon was vacated
- Sept 9: Rented baskets were picked up by Trinity Rentals.
- Sept. 9: 13 pressure cores offloaded at UT for storage under pressure
- Sept. 12: All whole core logging and XCT was completed in College Station.
- Sept 13: Conventional core and MSCL-XZ scanner on route to SLC.
- 15 Sept. Conventional core and MSCL-XZ arrive SLC.
- 15 Sept: Geotek continued setting up facilities and laboratory spaces at SLC.

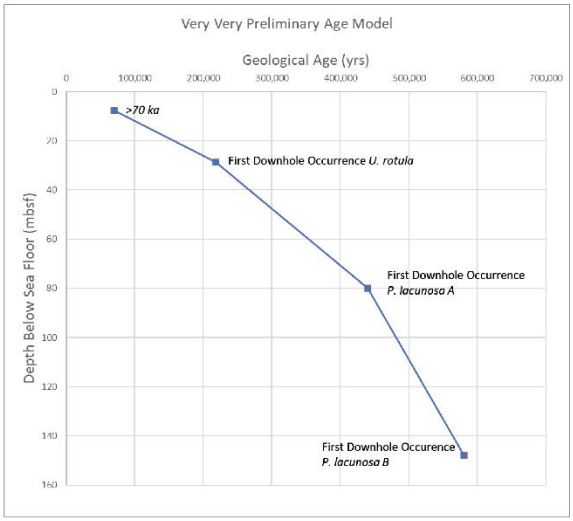
3. Forward Look:

- On September 18, scientists will arrive at Geotek in SLC to begin an intensive two-week period of core analysis .
- On September 19, scientists will start processing the shallowest core sections starting with sections from core H003-01H.

4. Science:

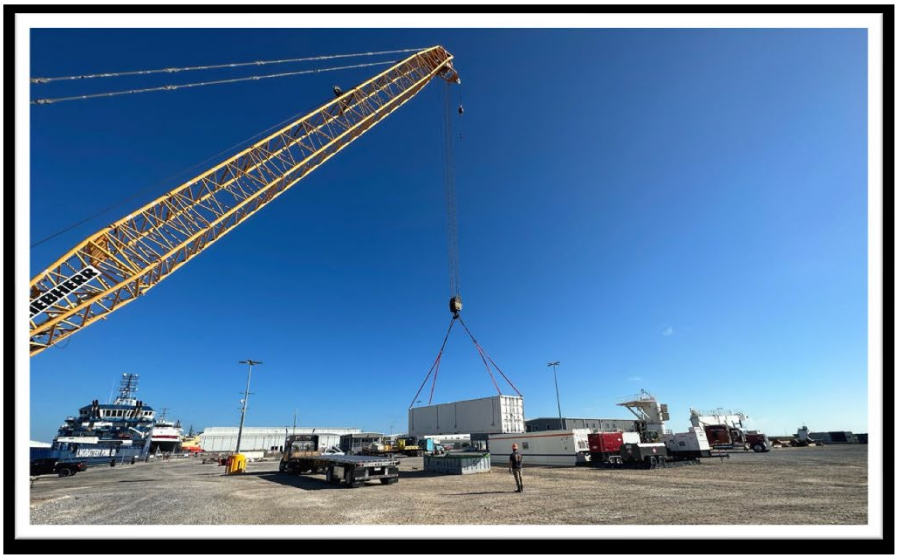
Paleontologist Marcie Purkey produced a preliminary age model from samples taken from the core catcher on each conventional core (see below). An initial age was interpreted for H003 only. The samples from H002 were sandy and did not contain microfossils. More samples will be collected in SLC to refine the age model.

1



Very preliminary aged model based on core catcher samples from the H003 well.

The Harvey Hermes docking in Port Fourchon on Sept.



On the ground at Harvey Dock, Port Fourchon.

Joey (Geotek) loading the 17 pressure from the GOM2-2 expedition into the PTRANS36.
This 40' specialized Geotek unit, with 36 overpacks, is a DoT certified system for transporting pressure cores which contain flammable gas in hydrate form. Cores were transferred to UT on Sept 9 and then remaining pressure cores were delivered to Salt Lake City.

Left: Pressure cores stored at UT. Right: the Geotek and UT team that transferred to pressure cores at UT.

The final container unit with all the cores arrived at Geotek Coring in SLC

18-September-2023 to 20-September-2023, SLC Operations

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATES: 18-September-2023 to 20-September-2023

2. DESCRIPTION OF OPERATIONS: Scientists arrived at Geotek Coring, started setting up the labs, and began analyzing core. We measured physical properties and took geomechanical samples. We began the process of splitting whole core, describing the core, and sampling from the split cores. Details are below.

- Sept 18:
  - Scientists arrived at Geotek Coring at 0900 hr and began to set up the labs.
  - The Coring Receiving Lab, G26, was set up for whole round cutting, strength measurements (table vane measurements and fall cone measurements), and thermal conductivity measurements. Cores H003-01H and H003-02H were brought into the lab to thermally equilibrate overnight. The mass of each core section was determined before cutting whole rounds.
  - Microscopes, sampling supplies, tables, and computers were set up in the Split Core Lab.
  - Boxes were unpacked from the Core Processing Lab. Scientists started sub-sampling discrete paleo-magnetic samples from the residual sediments left after pore water squeezing on the vessel ('Interstitial Water squeeze cakes').
  - CT images of cores from Hole H003 were reviewed and locations of whole rounds for geomechanical testing were identified for Cores H003-01H through -10H.
- Sept 19-20:
  - Core sections from core H003-01H-1 through -11H-CC were weighed. MDW (e.g. moisture and density with grain size, XRD, and other basic properties) and GEOM (e.g. geomechanics plus permeability, porosity, and other physical properties) whole rounds were cut, whole rounds were weighed again, table vane and fall cone measurements were made (one per section), and thermal conductivity measurements were made (at least one per core).
  - Sections from Core H003-01H through H003-09H were split, imaged including color spectrophotometry, laid out and described. Smear slides were created and reviewed.
  - Working halves of cores H003-01H through section H003-09H-4 were sampled for a range of further measurements (e.g. TOC, CHNS, isotopes, grain size, moisture and density, XRPD, X-ray fluorescence, rock magnetism, anomalies of magnetic susceptibility, paleontology, and biogenic silica). No authigenic carbonates or sulfide nodules were encountered.
  - Archival halves of sections H003-01H through -02H-3a were logged, measuring magnetic susceptibility and x-ray fluorescence.
  - On Sept 20, the science team from UW arrived at Geotek Coring Inc. at 0600 and began setting up the Pore water labs.

3. Forward Look:

- Researchers will continue making strength and thermal conductivity measurements, and cutting whole rounds
- Researchers will continue splitting, logging, describing, and sampling core sections.
- Researchers will start squeezing and preserving IW samples.

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4. Science

- Work continues on sediment strength testing in the onshore phase in Salt Lake City. The undrained shear strength is measured using a fall cone penetrometer and an automated vane shear device (Figure 1, left) on the ends of core sections prior to core splitting. The automated vane shear device records both the peak undrained shear strength and the residual shear strength, which will provide important information on the sensitivity. These measurements will supplement the strength measurements made offshore using a handheld vane and pocket penetrometer and more advanced testing during post-expedition activities. The measurements inform a range of geological processes including landslide development, and borehole instability, and rock strength.

- Massive upper fine sand composed of multiple amalgamated deposits was found in the first core H003-01H. This observation matches our observation during drilling where the shallow section was found to be very sandy. Scientists had expected this section to be more mud prone and this will be a puzzle to resolve.

Figure 1: Left: Athma Bhandari (U.T.) clamps a sample being measured for undrained strength with a Table Vane. The measurements tell us about the sediment's material properties. Derek Sawyer (Ohio State) drives the software for the analysis. **Right:** Jack Germaine (Tufts University) proudly demonstrates a whole core sample preserved for later geomechanical analysis.

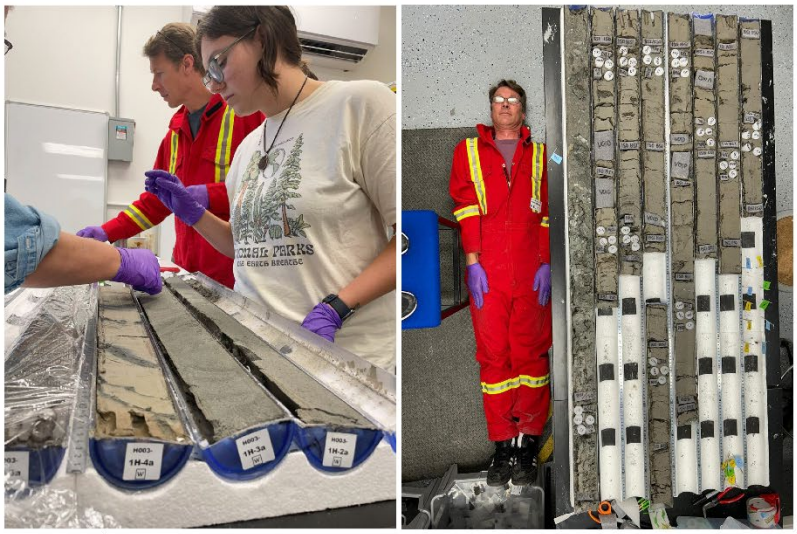

Figure 2: After the strength is measured and whole core samples are taken, the core is split. The split core is described and samples are taken. **Left:** Kayla Tozier (University of New Hampshire) begins the process of sampling the split core. Bill Waite (USGS) is in the background. **Right:** Looking down on the split core after it has been sampled. Bill Waite (USGS), who is over 6' tall, is used for scale.

21-September-2023 to 23-September-2023, SLC Operations

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATES: 21-September-2023 to 23-September-2023

2. DESCRIPTION OF OPERATIONS: Scientists continued working at Geotek Coring, measuring physical properties, collecting geomechanical samples, splitting whole core, scanning and describing the core, and sampling from the split core. Details are below.

- Sept 21:
  - UW researchers finished setting up the pore water labs and began squeezing samples.
- Sept 22
  - Geotek received, set up, and tested a new loop magnetic susceptibility sensor for scanning whole round conventionalized core, which was not scanned on the MSCL-S.
  - UW researchers squeezed several pore water whole rounds.
- Sept 21-23:
  - Core sections from conventional core H003-10H-1a1 through -26H-CC were weighed. MDW (e.g. moisture and density with grain size, XRD, and other basic properties) and GEOM (e.g. geomechanics plus permeability, porosity, and other physical properties) whole rounds were cut, whole rounds were weighed again, table vane and fall cone measurements were made (one per section), and thermal conductivity measurements were made (at least one per core). Conventionalize core sections were held until loop magnetic susceptibility scans could be completed. All conventional core have now been processed.
  - Sections from conventional core H003-10H-1a1 through -26H-CC were split, imaged including color spectrophotometry, laid out and described. Smear slides were created and reviewed.
  - Working halves of cores H003-10H-1a1 through -24H-CC were sampled for a range of further measurements (e.g. TOC, CHNS, grain size, moisture and density, XRPD, X-ray fluorescence, rock magnetism, anomalies of magnetic susceptibility, and paleontology). All conventional core have been processed.
  - Archival halves of sections H003-02H-4a through -03H-5a were logged, measuring magnetic susceptibility and x-ray fluorescence.
- Sept 23
  - Geotek scanned all conventionalized whole rounds using the loop magnetic susceptibility scanner.
  - UW researchers squeezed several pore water whole rounds.

3. Forward Look:

- Microbiology researchers will arrive and set up the Core Processing Lab for sub-coring of cryo-cores for cell counts and DNA analysis.
- Researchers will continue making strength and thermal conductivity measurements, and cutting whole rounds
- Researchers will continue splitting, logging, describing, and sampling core sections.
- Researchers will continue squeezing and preserving IW samples.
- Geotek will scan all conventionalized core from H002 using the loop magnetic susceptibility scanner

4. Science

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University of Washington researchers working in the pore water labs. Left: Man-Yin Tsang prepping a sample for pore water squeezing in the Pore Water Reefer. Right: Taylor Walton making a refractometer measurement.

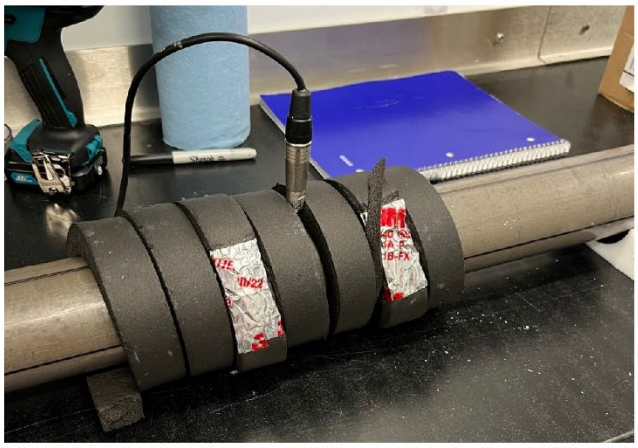
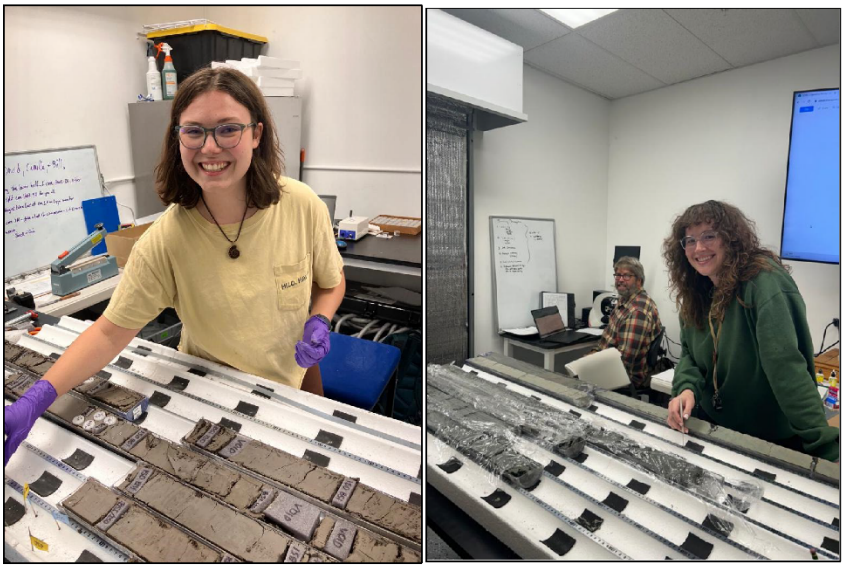
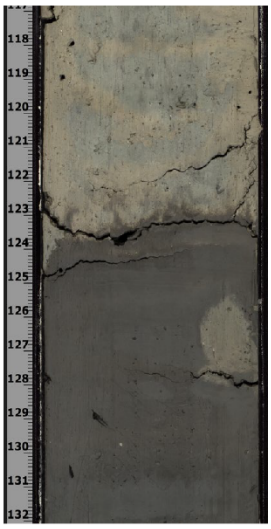


Photo of a thermal conductivity measurement in progress. A hole is drilled though the core liner and the probe is inserted. The core is wrapped with insulation before starting the test. Thermal conductivity measurements are progressing. All the conventional cores have been measured.



University of New Hampshire researchers and many others continue working in on the split core. Left: Kayla Tozier at the split core sampling table. Researchers bagged their 1,700th split core discrete sample marking the completion of sampling all conventional core. Right: Joel Johnson looking at smear slides and Camille Sullivan working on core description.



Core Section H003-14-1 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 filled with the lighter color overlaying biogenic pelagic ooze on top (123.5 cm and higher).

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Science Team celebrates the birthdays of Athma Bhandari and Carla Thomas.

23-September-2023 to 28-September-2023, SLC Demobilization

Daily Operational and Science Report
UT-GOM2-2 Coring Expedition
Terrebonne Basin, Gulf of Mexico Outer Continental Slope

1. DATES: 24-September-2023 to 28-September-2023 **FINAL REPORT**

2. DESCRIPTION OF OPERATIONS: Scientists completed working at Geotek Coring, measuring physical properties, collecting geomechanical samples, splitting whole core, scanning and describing the core, and sampling from the split core. All samples, supplies, and equipment were packed. Details are below.

- Sept 24-27:
  - The microbiology team arrived, setup equipment, and sub-cored all cryo-cores. Sub-cores were divided for cell counts at JAMSTEC and DNA extraction at Oregon State.
  - All remaining core sections from conventional and conventionalized core were weighed. MDW (e.g. moisture and density with grain size, XRD, and other basic properties) and GEOM (e.g. geomechanics plus permeability, porosity, and other physical properties) whole rounds were cut, whole rounds were weighed again, table vane and fall cone measurements were made (one per section), and thermal conductivity measurements were made (at least one per core).
  - Gas hydrate was uncovered while sub-coring and splitting cryo-cores. See picture below. All remaining core sections were split, imaged including color spectrophotometry, laid out and described. Smear slides were created and reviewed. Rinds of cryo-cores were also split and described.
  - All remaining sections were sampled for a range of further measurements (e.g. TOC, CHNS, grain size, moisture and density, XRPD, X-ray fluorescence, rock magnetism, anomalies of magnetic susceptibility, and paleontology).
  - Archival halves of sections continued to be logged, measuring magnetic susceptibility and x-ray fluorescence.
  - UW researchers finished squeezing the remaining pore water whole rounds.
- Sept 27-28
  - Researchers packed up samples and supplies.
  - 31 individual containers of mainly samples were shipped to eight labs.
  - Equipment and supplies were consolidated into six pallets and prepped for shipping.
  - First round draft of the Expedition Methods was completed.

3. Forward Look:

- Archival and working halves of all conventional and conventionalized core will be shipped to UT Austin with Whole Rounds and bagged samples for testing at UT
- Pro-log Core Processing Lab and Pore Water Lab will be returned to Pro-Log.

4. Science

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Geotek Extracting a cryo-core from the liquid nitrogen depressurization chamber

Gas Hydrate (white chunks) in core section H002-11CS-1 from pressure core H002-11CS cored from the Orange sand. This section was cryogenically frozen before depressurization. The section was then kept at -80 C until it was sub-cored for cell counts and DNA extraction at Salt Lake City.

Left: Joel Johnson (UNH) preparing a smear slide. Right: Ann Cook (Ohio State) and Tim Collet (USGS) extracting samples from split core.

Steve Phillips (USGS) and Rachel Coyte (Ohio State) measuring the volume of produced gas and capturing gas samples for assessments of dissolved gases, hydrate saturation, and gas composition including hydrocarbons, isotopes of Carbon, and Nobel gases.

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