

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.

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.

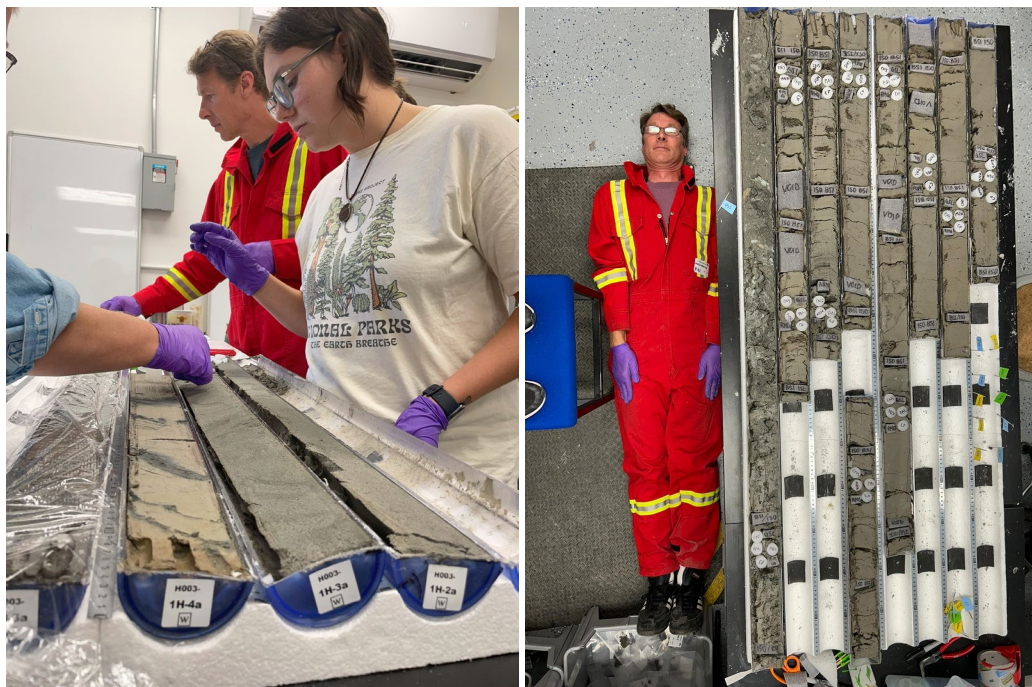


Figure 2: After the strength is measured and whole core samples are taken, the core is split. The split core is described and samples are taken. **Left:** Kayla Tozier (University of New Hampshire) begins the process of sampling the split core. Bill Waite (USGS) is in the background. **Right:** Looking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