USIO Technical Panel Meeting
March 27-28, 2012
College Station Texas

Meeting Notes

Meeting Attendees:

Members	**USIO Members**	**Guests**
Bryan Edwards – American Diamond Tools	Gerry Iturrino - LDEO	Jamie Allan - NSF
Nathan Frisbee - SLB	Bill Rhinehart - TAMU	Nori Kyo - CDEX
Steve Howard - Howard and Associates	Mitch Malone - TAMU	Dave Smith - ESO
Bernhard Prevedel - ICDP	Mike Storms – TAMU	
Frank Williford	Greg Myers – COL	

Summary
The purpose of the first UTP meeting was to formalize the functioning of this team, review drilling proposals and their technology needs, identify technology gaps and consider, off the shelf and incipient technologies/ approaches used in industry that may be adaptable for scientific ocean drilling.

Table of Contents

I. Proposal 749 Guaymas Review:....2
II. Proposal 740 Galicia Margin Review....3
III. Hess Deep Plutonic Crust Review....4
IV. Superfast / Hole 1256D Expedition 336 Superfast 4 Review....5
V. Technology gaps....6
VI. Drilling/Engineering Opportunities for IODP....7

I. Proposal 749 Guaymas Review:

Title: Guaymas Basin Transect
Location: Gulf of California
Water Depth(s): 1600-2050m
Hole Depth(s): 400-1300m
Formation: Sedimentary and basement
Type of Operation: Piston and rotary coring and logging
Challenge: 200° C (or higher?) at two locations

A. Site selection
    1. Try to avoid the sites with the highest temps (as much as possible) since temperature will determine feasibility
B. Rotary Coring:
    1. Split metal liners could be very helpful (vendors needed to fabricate them, may be expensive), investigation needed.
    2. Temperature monitoring needed – to be run on the core barrel
    3. Hi temperature grease and lubes in bearing in bottom of the system
C. Piston coring:
    1. Circulate cooling fluids to protect downhole equipment
    2. Temperature monitoring needed - to be run on the core barrel
    3. APCT-3 (formation temperature) tools are rated for 85°C and now can be run up to 120°C
    4. SET (formation temperature) tools rated for 85°C and now can be run up to 120°C
    5. Hi Temp grease and lubes in bearing in bottom of the system
D. Hi Temp materials
    1. LFV seals needed (to be investigated)
    2. 300°C bits likely available
        a) Rotary bit seals (what can we do about this?)
E. Fluid chemistry
    1. H_2S likely an issue (safety panel) and metal corrosion issue
    2. Gas influx through o-rings
F. Logging
    1. Standard logging with the addition of temperature tools
    2. 175°C is present T rating of logging tools
    3. Flasked tools are an option, yet tools are larger (4” diameter)
    4. Availability of these tools can be an issue
    5. Wireline is rated for around 200°-250°C

6. Wireline fluid temperature tool MTT 300°C
7. Hi Temp grease and lubes

G. Main points to capture
   1. Seals in general
   2. Grease and lubes
   3. Liner materials

II. Proposal 740 Galicia Margin Review

Title: Deep Galicia Margin
Location: west of Spain
Water Depth(s): 3300-5300 m
Hole Depth(s): 900-190 0m
Formation: Basement is primary target
Type of Operation: Rotary coring
Challenge: Deploying 7200 m of drill string
Challenge: Hole cleaning for 1900 m penetration

A. Well design and project planning
   1. Risk assessment for drill string (if we damage or lose string, what is programmatic impact?)
      a) This is especially important given the age of the pipe
   2. A drill string loss on this project could severely limit operational capability of the JR

B. Drill string safety
   1. Place the best pipe at top of the string, reduce bending stress
   2. Consider a rental string given the slow down in the natural gas market
      a) Strings should be available for rent
      b) Just rent the upper part/landing string/more knobbies
      c) Can be insured
   3. Consider different drill string materials (aluminum, titanium)
   4. Pipe rubbers (Steve Howard has thoughts on a reliable supplier
   5. A more resilent guide horn liner that can readily removed/disposed. Put the rubber on the guide horn? Put a more durable material on the guide horn?
   6. Dampen the drill string movement (needs to be investigated)
      a) Most movement seems to occur at the dual elevator stool
   7. 6 5/8" pipe (perhaps just the upper section) would help with strength of the string
      a) Must check hook load capacity to make sure we could do this
   8. Drill string stress analysis – more in depth analysis needed (using 150K material) to help make incremental improvements

C. Drill pipe composition (item II C above)

1. We should revisit the state of the art for drill pipe (different materials, steel tool joints, special coatings

D. Hole cleaning
    1. Mud program – planning on using conventional mud

III. Hess Deep Plutonic Crust Review

Location: Hess Deep, central Pacific
Water Depth(s): 4850-4870m
Hole Depth(s): 250-350m
Formation: Basement
Type of Operation: Rotary coring
Challenge: Initiating hole on zero-age crust

A. Well Design/hole planning in general
    1. Seafloor drilling system would be ideal to spud the hole where no sediment cover exists
    2. Hammer drilling system is no longer commercially available
    3. Small funnel casing link – drive or drill in
    4. Existing funnel mod – set it like the FFF
    5. Predrill the hole and install the casing hanger with a no or a trimmed down funnel to be able to see the reentry with the VIT
    6. Drill in casing system as an option
B. Well Design/hole planning in general for Hess Deep
    1. Running more collars to get as much slick pipe as possible
    2. High speed diamond bit and motor for spud in
    3. Additional casing strings needed
C. Drill bits
    1. Are there other options to roller cone technology that can be deployed?

IV. Superfast / Hole 1256D Expedition 336 Superfast 4 Review

Location: west of Costa Rica
Water Depth(s): 3635m
Hole Depth(s): 1245.5m
Formation: Basement
Type of Operation: Rotary coring
Challenge: Hole cleaning
Challenge: Drilling ultra-hard gabbro

A. Previous operation questions
    1. What do penetration rates look like on bit destruction run?
    2. Other drilling dynamic parameters should be considered?
    3. How did extreme tides affect the operation?

B. Well Design
    1. Reenter or start a new hole?
    2. Consider drilling through the difficult zone…then resume coring
    3. Is side tracking an option? Seems to make a lot of sense. Needs to be investigated, cost issues may limit the use of the technology
    4. Airlift drilling (left hand/reverse circulation)? Can it be done at these depths? This is worth investigating. Will require some vessel mods

C. Hole cleaning/stability
    1. Do we have adequate pumping capability?
    2. Have been using seawater with increasing amounts of mud pills
    3. Squeeze cement job to stabilize the hole prior to advancement. Do we have a cement packer that can be used to really squeeze the cement into the formation

D. Bit design
    1. PDC bits may be too brittle in high sea states
    2. Diamond bits will yield smaller cuttings and will work better with seawater
    3. Carbonado – 3 stones per carot, self fracturing/sharpening cutter
        a) Very durable, hard to find
    4. American Diamond Tool Impregnated “green series” bit with php diamonds
        a) Likes higher rpm
        b) Can handle some WOB variations (more than PDC bit)
    5. May want to consider a downhole motor with the impregnated green series bit. The downhole motors can turn higher rpm rates
    6. Diamond bits must be used in a clean/metal free hole.
    7. Some diamond bits with a tungsten matrix can handle some junk in the hole

E. Logging

1. Downhole video will be very useful for inspecting hole condition

V. Technology gaps

A. Severe budget realities- little to no funds for new development from IODP sources. Funding for large developments will need to come from other sources.

B. Cross platform utilization to achieve the science

1. Utilize the strengths of each platform (Riser, Riserless, Mission Specific Platform)

2. Education needed for science community to develop proposals that consider multiple platforms

3. Long term planning/scheduling is needed in order to make the multiplatform approach to work

C. New approaches to operations need to be considered – mindset changes needed

1. Multiplatform

2. Slower coring techniques (motor driven core barrel systems) that yield better core quality and quantity.

D. Incremental approach to operations or technology development

E. Incomplete list of problems to be solved

1. Spudding in zero age crust and establishing reentry hardware and casing

(1) Solution – seafloor rock drills for establishing shallow holes and shallow logging

(2) Obstacles – hole diameter, not currently ready to install reentry hardware

b) Solution – hammer drilling

(1) Obstacles – money and vendor

c) Solution – drill in casing

d) Solution – high speed, two stage drill – utilizes mud motor and bit to create a pilot hole that is followed by a full size bit

e) Turbine footing

2. Maintaining circulation and hole cleaning

a) Solution – Riserless mud circulation hardware

b) Solution – engineered drilling mud (loss seal?)

c) Solution – use more cement for sealing cracks

3. Hole stability

a) Thermal stresses are significant (1256D, KTB site) and largely unaccounted for…

b) Solution - Operational changes to reduce the thermal gradient between the formation and drilling fluid

c) Solution - Use cement squeezes in trouble spots (cement packers should be investigated)

d) Solution – expandable casing

4. Core quantity and quality

a) How to improve the APC to XCB transition? Just get the right tooling?
   (1) ½ core APC
   (2) Other core barrels…such as "Alien" corer
   (3) Other mining technology
b) new bit technology should be considered and tested
   (1) Modern bit technology has improved dramatically
      (a) Tungsten carbide bond – large diamond grit
      (b) Diamond costs have come down
   (2) May be time to try impregnated bit technology again?
      (a) Grit improvements may have overcome the matrix matching requirements
c) Pressure balanced bumper sub
   (1) To manage the WOB fluctuations
   (2) Cannot core through, although ESO showed us a system that ESO did core through

5. Project scheduling, more modular
   a) Solution – flexibility to conduct brief operations specific to a variety of projects

F. New project suggestions
1. Test new impregnated bits?
2. Heave comp baseline study
   a) Crisp LWD to RIS data
   b) Intern to process data
3. Investment preservation
   a) Drill string conservation process
      (1) Painting, coating
      (2) Some coatings could add buoyancy to the pipe

VI. Drilling/Engineering Opportunities for IODP

A. Expandable casing – could be very applicable…but not quite ready yet for IODP purposes

B. Expandable liner – applicable…expensive

C. Vendor/IODP cooperation projects – leverage the low cost – very deep water JR

D. Must deal with the budget struggles with key technologies such as VIT and drill string. What is our threshold for "showstoppers"
1. Quantity/quality of pipe
2. Equipment inspections
3. Functionality of reentry systems

E. Top Hole Batch Drilling to supplement the budget
1. Consider marketing the JR to operators

2. JR is accomplished in subsea installations

F. Remember to include “tooling costs” (drill pipe) in the mob fees for off-contract work

G. Mud losses and mud control