Week 3 Drilling and Scientific Report for IODP Expedition 325
Great Barrier Reef Environmental Changes

26th February – 4th March 2010

1. Operations

February 26th was spent waiting on weather. By early morning on the 27th, the rough weather was beginning to subside. Vessel positioning and DP problems had also been addressed. The secondary positioning system was deployed, which was closely followed by setting up the drill string and seabed template. A downhole pre-coring camera survey was conducted, and coring operations began. After the 2nd core run, a new problem occurred when all electrics to the drill control shack failed. This delayed operations by several hours. Several runs after coring re-started, the bit became blocked in very loose coral sand and it was several more hours before coring could resume. Just before Midnight on the 27th February, the decision was made to attempt HQ coring, having advanced the hole to 8.5m mbsf.

The API was set inside the seabed template within the moonpool, (a long process). This completed, it soon became apparent that although the API hung in a more vertical position than when it was set above the moonpool door, the seabed template had more lateral movement within the moopool and thus it was not possible to run HQ without a distinct possibility of twisting off the HQ string. With the strong currents that have been experienced it is looking less likely that HQ can be safely run in Hydrographer's Passage area, although we will keep trying. The decision was taken early morning on the 28th February to return to API coring and by dawn several excellent cores were recovered. Mud mixing tanks issues once again brought the coring to a halt when air appeared to be entering the suction line of the suction pump. Coring continued until midnight in short 1.5m runs, achieving 12 core runs and an advancement in depth of 8.5m to 25m, with some occasional pauses for blocked bits.

During the early morning of March 1st, technical problems with the core barrels and loose coral sand in the hole meant that only one core was achieved in the early hours. Three more runs in an unstable hole were completed before the coral boundary was reach. The API string was tripped to 5m above seabed and the camera lowered to check the seabed. After recovering the over the side transponder, the vessel moved to the next location approximately 10m away. The vessel was then moved in increments of 3m to an area of coral outcrop, by viewing the seabed with the camera. The camera was recovered and the hole started. Although fossil coral was seen at the seabed in outcrops, the cores recovered indicated loose coral sand with mixed recovery rates. Sixteen cores were recovered throughout the day from M0036A.

Five core runs were made in the first three and half hours of March 2nd. The lithologic regime changed again to very loose coral sands and the hammer sampler was employed to free the blocked bit. The final core for M0036A arrived on deck at 06:30. Wireline logging followed which began by setting up equipment on the rooster box, followed by running the in-pipe natural gamma log. Once this log was completed the hole was circulated with mud prior to pulling the drill string to 9m below seabed, where the first loose sands stopped. The seabed template was then run to the seabed, which was slow due to strong currents encountered. The template is used to clamp the API string to provide a seabed reference, and heave compensate the API string at different pull back positions in the hole. Logging operations continued until midnight.

March 3rd started with demobbing of the wireline logging equipment. The seabed template was then raised to the moonpool, followed by the drill string. The downhole camera was deployed to view the seabed post drilling. Unfortunately a combination of night time, strong currents and high suspended sediments meant that the seabed could not be viewed as the light reflected off the particles in suspension. With the recovery of the camera and over the side transponder, the vessel slowly moved to the next site approximately 300m seaward whilst the drilling contractor carried out essential maintenance. By late morning the drill string had been run to 4m above the seabed and the seabed camera deployed to view for live corals. No live coral was found and by early afternoon the API pipe had been spudded into the seabed, and the 1st core run completed. By midnight 13 core runs had been completed and the final run was being cored.

The 14th and final core run arrived on deck just after midnight on March 4th to complete hole M0037A. The drill string was tripped to above the seabed to provide enough clearance to move to the next site. As the vessel moved to the next site and mud was being prepared, the mud suction pump shaft bearing failed and for the next 11 hours it was stripped down and repaired. As soon as the pump was repaired the seabed camera survey was deployed. Fossil coral reef was distinctly visible and no life confirmed. The first core run returned an excellent piece of hard coral and a shattered PCD core bit. Being concerned that the fragments of the bit

had been left down the hole, the drill string was lifted and the vessel moved to avoid going down the same hole. Coring started again and continued until midnight with 9 runs in excellent weather and sea state conditions.

2. Hole summary

Hole	M0035A	M0036A	M0037A	M0038A	M0039A
Latitude	19^0 40.3582 S	19^0 40.34388 S	19^0 40.2449 S	19^0 40.29613 S	19^0 40.29 S
Longitude	150^0 14.63005 E	150^0 14.63781 E	150^0 14.77592 E	150^0 14.69425 E	150^0 14.69326 E
First core	27/02/2010 at 12:00	01/03/2010 at 11:50	03/03/2010 at 13:30	04/03/2010 at 15:45	04/03/2010 at 17:00
Cores recovered	1R – 23R	1R – 22R	1R – 14R	1R	1R – 9R
Drilled length	29.9m	34m	21m	1.5m	13m
Recovered length	12.23m	8.91	7.52m	0.18m	5.24m
Core recovery	40.9%	26.21%	35.81%	12%	40.31%
Depth reached	29.9 mbsf	34 mbsf	21 mbsf	1.5 mbsf	13 mbsf

3. Science summary

Hole	Core	Sediment Description	Comments
M0035A	1R	Rubble including bryozoans, bivalve, coralline algae and *Halimeda*	Believed to have been sourced mostly from the seafloor
	2R	As above	
	3R	Massive *Acropora* and reef framework	Shallow water facies possibly starting in this core
	4R	Branching corals and Giant Clam (*Tridacna gigas)* fragments	Indicates a shallow water environment
	5R	1.1m recovery of fragmented framestone, containing branching corals, *Halimeda* and coralline algae.	
	6R	Ca. 40cm of broken coral framestone composed of massive *Acropora palifera/cuneata* with thin microbialite crusts.	
	7R	Broken fragments of coralgal-microbialite framestones	
	8R	~1m continuous coral framestones. Thick crusts of coralline algae (encrusted by vermitids), microbialite.	
	9R	~50cm coral framestones	
	10R and 11R	Coral framestone including *Acropora* sp. *Pocillopora* sp. and *Tubipora* sp. Massive *Acropora* sp. pieces coated with coralline algae	Shallow water corals recovered
	12R	Framestone and sands	
	13R	Packstone recovered from the core catcher. Framestone including massive coral in the main core section	
	14R	Framestones and massive corals	
	15R	Massive corals with lime pebbles embedded in framestone facies	
	16R and 17R	Framestone, with well preserved Faviid in Core 16R and massive microbialite and algae crusts in 17R	
	18R	Framestone	Darker colour to the corals. Dominant microbialite structures observed
	19R and 20R	Coral framestone, massive microbialite and some internal lithified sediments.	
	21W	Wash core – recovery of 90cm unlithified carbonate sediments	Infill / wash
	22R		Bit became blocked – major lithology change between 20 and 22R?
	23R	9cm section of well lithified grainstone / packstone with abundant *Halimeda*, benthic forams and bivalves.	Older Pleistocene deposits?
M0036A	1R	No recovery	
	2R	Modern marine bryozoans and algae with fossil corals (*Acropora* sp.)	Base of core believed to have reached fossil (deglacial?) surfaces
	3W	Wash core – no advance in depth	
	4R	100% recovery of sand with no massive corals	
	5R	Base of 5R contained branching corals (*Acropora* sp.)	

	6R	Predominantly sandy sediments. Some evidence of Halimeda, bryzoan and small bivalves.	
	7R	Framestone consisting of branching corals	
	8R	Massive *Acropora* in the core catcher. Lime pebbles wit0. h fragments of coral and *Halimeda*	
	9R	Core catcher as above	
	10R and 11R	Framestone, with massive corals in 11R	
	12R and 13R	Corals including Faviid	
	14R	Massive *Acropora* in the core catcher	
	15R to 18R	Coral framestone and abundant microbialites	
	19R and 20R	45cm of broken framestone, with encrusting corals and large fragments of a coarse grainstone / packstone in the core catcher (19R). Extensive boring and encrusting by serpulids on core catcher material.	Turbinaria and Montipora encysting corals
	21R	50cm unlithified carbonate sediments	
	22R	Unlithified sands	
M0037A	1R	1.83m section of sand, lime pebbles, *Halimeda* debris, encrusting forams, bryzozoan and echinoids.	
	2R	Lime pebbles with cemented limestone in the core catcher	
	3R	No recovery	
	4R	Well cemented graystone	
	5R and 6R	Lime pebbles with fragments of branching corals, forams, molluscs and *Halimeda*	
	7R and 8R	Mixture of lime pebbles and gravels	
	9R	As above but with less *Halimeda* fragments and more benthic forams	
	10R	1.5m recovery of sand and gravels with forams present	
	11R to14R	Lime pebbles and gravels	Possibly slope deposits sourced from upslope
M0038A	1R	Massive *Porites* like *Acropor*a sp.	*Cuniata / palifera*
M0039A	1R	~50cm of massive coral (*Acropora* sp.)	
	2R	Lime pebbles dominated, but with massive coral in the core catcher	
	3R and 4R	Framestone and massive *Porites / Acropora* corals. Thick crust of microbialite in 4R core catcher	
	5R	Framestone and coral fragments. Sediment coated massive Faviid in core catcher	
	6R	Framestone and massive coral in core catcher	
	7R	50% recovery of reef framework – framestone and thick microbialite and massive coral	
	8R	62% recovery of framework in which Faviid massive corals dominated	
	9R	Massive in-situ *Acorpora* and cm scale microbialite framestone	

4. HSE Activities / Environmental

Monitoring of a possible tsunami risk began at 16:34 on February 27th. This was cancelled at 16:11 on the 28th. A fire drill was carried out on February 28th. Following the de-brief, changes to the muster procedure for fire drills were implemented. The deployment and recovery of the rescue boat was practised by the vessel on March 4th.

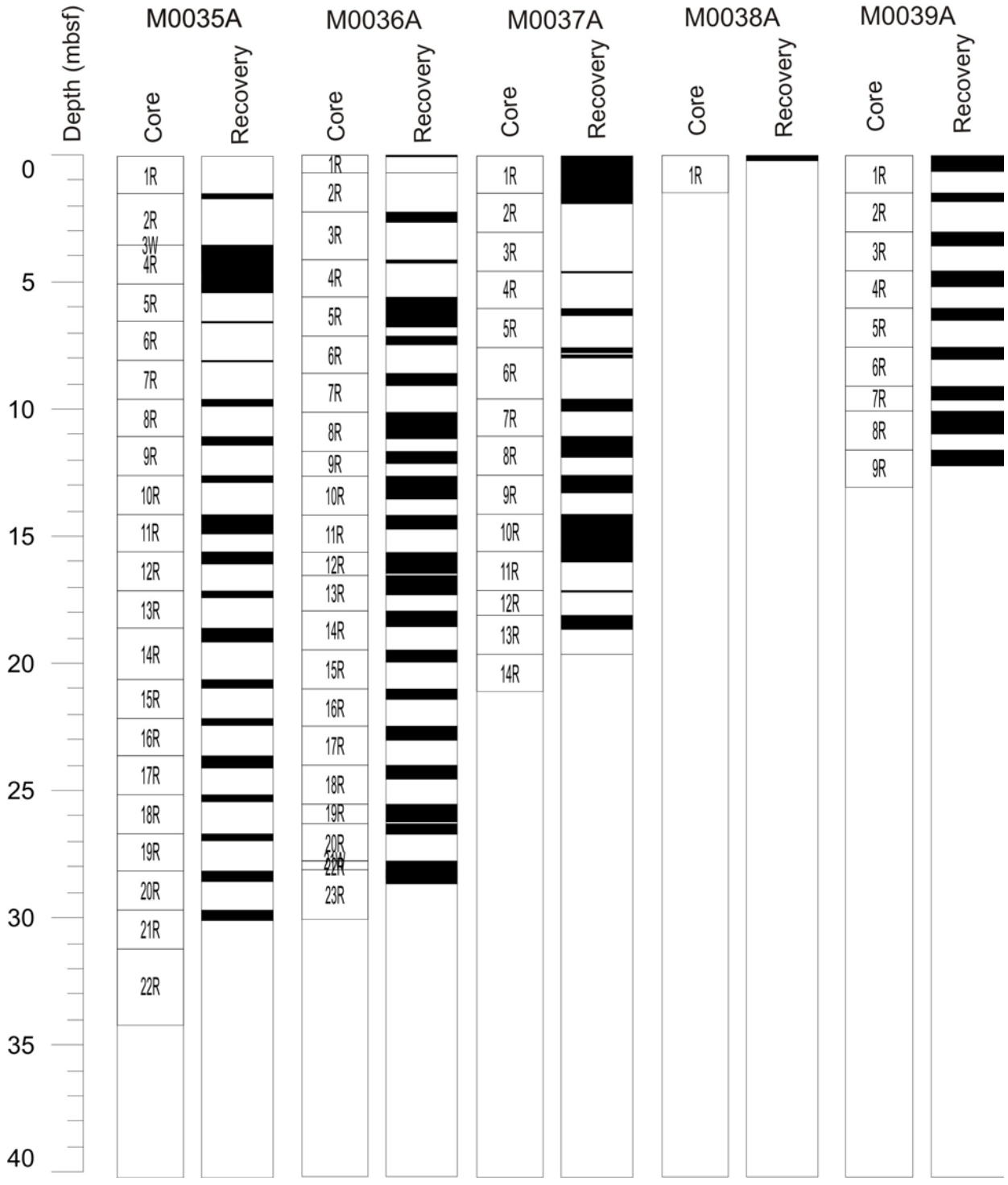
5. Figures

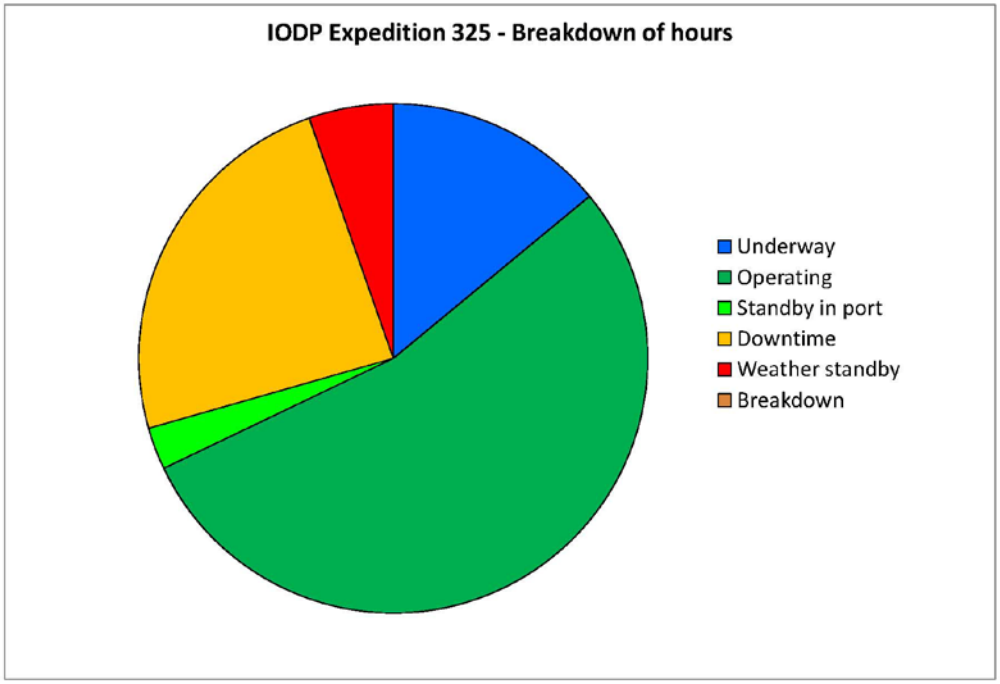
On next two pages:

Figure 1 – Recovery and depth plot for Holes M0035A – M0039A

Figure 2 – Breakdown of hours up to 2400 hrs on 4th March. No contractual implications can be made from this summary.

Expedition 325
Week 3
HYD_01C - Sites 8, 9 & 11





Note on Figure 2. The diagram above includes an estimated “downtime” of 14 hours, “standby in port” of 13.5 hours and “underway” of 45.75 hours that occurred off contract.