

12<sup>th</sup> February – 18<sup>th</sup> February 2010

## 1. Operations

This is the maiden voyage/project for the 'Greatship Maya', the drilling platform only installed and commissioned the day before 'Maya' sailed from Singapore to Townsville. Coring sea trials had taken place the week before heading to Townsville in which IODP-ESO coring representatives were on board as observers. As it turned out they also became teachers for the API coring tools. Although this 2<sup>nd</sup> attempt at coring trials had largely shown the coring systems to work, the drilling platform had not been shaken down as an operational facility.

This became very evident upon leaving Townsville and heading to the first work area. There were various problems with the vessel and then with the coring during the start of the first core site. For the next three and half days the drilling systems were shaken down with a great deal of assistance and hard work from IODP-ESO operational staff. There were numerous failures and breakdowns during this period in addition to some inexperience in the drilling crew.

After the third day of coring operations improvements in all drilling aspects were seen and it was good to see the drilling crew beginning to work well in teams. There are many aspects that still require attention, but it is evident that at the end of this first week we have the makings of a vessel and drill crew that can provide an adaptable coring service.

Thursday 11<sup>th</sup> February saw the vessel transiting towards the first site, M0030A at HYD\_01C Site 5, arriving late on the 12<sup>th</sup>. On arrival, spin tests and corrections were made around the drill derrick for the DP prior to coring activities commencing on the 13<sup>th</sup>, using API pipe with either ALN or EXN core barrels. Technical problems resulted in tripping the drill string and re-tagging the seabed by midnight at M0030B.

After three coring runs, technical problems again resulted in the drill string having to be tripped on the 14<sup>th</sup>. The decision was taken to move to M0031A (HYD\_01C Site 6), and coring operations re-commenced late afternoon of the 14<sup>th</sup>. Technical problems with the mud pump, combined with loose coral sands jamming the core barrels and hole instability, resulted in poor recovery rates on the 15<sup>th</sup>. The target depth for M0031A was reached early on the 16<sup>th</sup>, and through pipe gamma logging was completed.

The vessel moved to M0032A and coring operations began late morning. Coring at M0032A was completed on the 17<sup>th</sup>, seeing a slight improvement in recovery rates.

Maintenance of the rig hydraulic power packs delayed transit to the next site (M0033A). Coring operations began by mid-afternoon on the 17<sup>th</sup>, seeing improved recovery rates. Problems with liners jamming and latch heads on the 18<sup>th</sup> resulted in a slowing in coring rate. The target depth was reached just after lunch.

Transit to site M0034A (HYD\_01C Site 3) began late afternoon. Coring commenced using API just before midnight, to spud into the seabed prior to running the HQ coring system.

## 2. Hole summary

Hole	M0030A	M0030B	M0031A	M0032A	M0033A
Latitude	19° 40.914 S	19° 40.914 S	19° 40.737 S	19° 40.7301 S	19° 40.7330 S
Longitude	150° 14.274 E	150° 14.274 E	150° 14.377 E	150° 14.379 E	150° 14.391 E
First core	13/02/2010 at 10:00	13/02/2010 at 22:45	14/02/2010 at 18:25	16/02/2010 at 12:00	17/02/2010 at 15:30
Cores recovered	1R – 2X	1R – 3R	1R – 17R	1R – 20R	1R – 23R
Drilled length	6m	9m	46.4m	36.7m	32.8m
Recovered length	0.24m	0.55m	5.68m	5.99m	13.41m
Core recovery	4%	6.11%	12.24%	16.32%	40.88%
Depth reached	6mbsf	9mbsf	43mbsf	36.7mbsf	32.8mbsf

## 3. Science summary

Hole	Core	Sediment Description	Comments
M0030A	1R	~5 cm corallgal-bryozoan-serpulid boundstone in the core catcher. Outer surface covered by a thin coating of living biota (coralline algae, sponges and bryozoans and benthic forams).	
	2R	Coarse bioclastic (mollusc, bryozoans, foraminifera, serpulid, echinoids) gravel-pebble sediments	
M0030B	1R &	Small amount of pebble sized bioclastic sediments of similar	

	2R	composition.	
	3R	Coarse pebble sized bioclastic sediments with a 4 cm massive shallow water (<5 m) <i>Acropora</i> (sp. <i>palifera/cuneata</i> ) coral (jammed in the core catcher).	The coral was likely in growth position with well preserved corallites exposed on the upper surface.
Coring results from M0030A & B, albeit with very poor recovery, suggest about 9 m of unlithified carbonate sediments overlying a buried shallow fossil reef at ~ 95 m below present sea level.			
M0031A	1R	No recovery	
	2R	30 cm of pebbles sized bioclastic sediments (corals, gastropods, etc) with some living crusts of coralline algae. A 5 cm massive shallow water (<5 m) <i>Acropora</i> (sp. <i>palifera/cuneata</i> ) coral and lithified limestone fragments were jammed in the core catcher.	
	3R	20 cm of carbonate sand and pebbles - pieces of broken coral fragments, some stained and covered by serpulid worms.	
	4R	25 cm of coarse pebble sized bioclastic sediments (corals, echinoids) some of which are stained brown-orange. Fragments of broken grainstones with identifiable serpulids, bivalves, echinoids were also common in this sediment.	
Major problems with hole stability			
	5R	Only fine-medium carbonate sand (Halimeda, benthic forams and carbonaceous grains) within a muddy matrix were recovered.	
Bottom part of the hole caved			
	6R	A dark grey mudstone/wackstone with visible gastropods, benthic forams was recovered from this core catcher and sandy sized bioclastic sediments (corals, bivalves, algae, benthic forams) plus limestone fragments	
	7R & 8R	Several large coral framestones in the core catcher and lower sections of the cores. The corals were composed of massive <i>Acropora</i> (sp. <i>palifera/cuneata</i> ) and robust branching <i>Acropora</i> sp. Several large fragments of framestone were observed composed of branching corals encrusted by coralline algae and then grey microbialite crusts, along with many broken corals fragments ( <i>Acropora</i> sp., Faviidae, <i>Pocillopora</i> ?).	<i>Acropora</i> - these were likely <i>in situ</i> and are consistent with shallow water, high energy (<5m?) reef environments.
	9R	Clasts rubbles and coral pieces. Small <i>Porites</i> fragments were identified. Fragments of reef framework were also seen.	
	10R	sandy materials plus bioclasts with basal layer were captured	
	11R & 12R	Well preserved pieces of <i>Acropora</i> corals found. Some other pieces had coralline algal coatings. Halimeda and robust coral branching were also included.	
	13R	1.5m of greyey sandy materials	
Most of the cores were filled with large Halimeda sand with fossil coral branches, forams and echinoids.			
	14R & 15R	Halimeda and coral pieces were observed. Bottom of 15R Halimeda and coral pieces were observed. may indicate Pleistocene sedime	
	16R	Fragments of corals and bivalves ( <i>Tridacna</i> ) and bioclastic carbonate sediments.	
	17R	Bioclastic carbonate sediments, fragments of broken and abraded corals and bivalves ( <i>Tridacna</i> ) and grey limestone clasts. Some of the coral fragments appear to be diagenetically altered.	
M0032A	1R	~50 cm recovered. Contained several branching <i>Montipora</i> and core catcher materials composed of algal sand and crusts. Some of live algae were attached onto the crusts.	
	2R	No recovery	
	3R	Captured massive coral pieces some of which coated by coralline algae. Massive coral fragments were also included.	
	4R	Lime pebbles with sand and gravels.	Lower section consisted of very fine clay size material that may have been produced as a result of coring operations.
	5R	Divided into two lithological units. The upper level consisted of coral grainstone, whereas the lower part was fine clay material, as was observed in the previous core.	1 m run.
	6R	Consisted of coral framestone	

	7R	30 cm long massive <i>Acropora</i> (sp. <i>palifera/cuneata</i> )! This indicates very shallow high-energy environments when this coral grew.	2 m run
	8R	25 cm recovered. The lower part of this core contained framestone composed of massive corals.	
	9R	Massive <i>Acropora</i> sp. in the core catcher.	
Shorter coring runs have improved core recovery statistics			
	11R	Large pieces of broken coral framestone (massive corals) sometimes coated by grey (microbialite?) crusts. The surface of the massive coral at 25 cm in section 1 was coated by a prominent orange stain	
	12R	16 cm recovered. Coral framestone ( <i>Acropora</i> , Pocilloporidae) was observed with cm scale crusts of microbialite containing visible bioclastic grains.	
	13R & 14R	Large pieces of framestones characterised by corals (Faviid) with coralline algal and microbialite crusts.	
	15R	A medium carbonate bioclastic sand composed of echinoid, spines, gastropods and corals grains.	
	16R	30 cm of the same sand deposits	Switch to metal splits for this core.
Clear from the recovered core material and drop in drilling resistance that there is a major change in lithology from Core 14R (coral framestones) and Core 15R (unlithified medium carbonate sands) at about 25 mbsf or ~ 115 m below present sea level.			
	17R	No recovery	
	18R	Fragments of float/rudstones composed of <i>Halimeda</i> bryozoans, bivalves, benthic forams and coral fragments that show evidence of dissolution. The core catcher material was composed of broken and altered corals (Faviid, <i>Goniopora</i> , massive <i>Acropora</i> ).	CC sediments may indicate Pleistocene deposits.
	19R	Composed of similar material to Core 18R but also included 1-2cm re-crystallized grains.	
	20R	No recovery	
M0033A	1R	Biocrastic boundstone.	
	2R	Framestone with algae crusts	
	3R	Framestone with algae crusts	
	4R	Massive coral with calcareous algae including some <i>Halimeda</i> plates.	Plastic liner.
	5R	1.4 m of massive coralline algae with coral fragments.	Binding structures of algae seen in this core is indicative of fore-reef slope environment.
	6R	30 cm of coral with calcareous crust.	
	7R	Massive corals, such as <i>Favid</i> and <i>Acropora</i> sp.	First microbiological sample was taken from 40-45 cm of core
	8R & 9R	Dominated by massive <i>Acropora</i> sp. ( <i>palifera/cuneata</i> ).	
	10R	Continuous sequence of massive corals ( <i>Acropora</i> ?) with visible coralline algal crusts and microbialite.	
	11R – 19R	Lithologies dominated by framestones composed of coral ( <i>Acropora</i> sp, massive Favid), coralline algal and microbialites with some continuous sequences, and others broken but likely <i>in situ</i> .	Corals and associated sediments are likely characteristic of shallow, high energy depositional settings.
	20R	Mainly unlithified carbonate sediments indicating a change in lithology at about 25-26 mbsf from the mainly coral framestones above.	
	21R	Lime pebbles and few sand sized fragments	
	22R	Major component was lime pebbles, and the core catcher was occupied mainly by well cemented packstone including fragments of <i>Halimeda</i> plates and branching corals.	
	23R	Conducted to confirm that we had advanced below the facies boundary between the Pleistocene and the last deglacial sequences.	Three dating samples were selected from the core catchers of 3R, 7R and 15R.

#### 4. HSE Activities / Environmental

A vessel safety and orientation briefing was conducted by Bluestone's HSE Officer on the Greatship Maya at 1000 hrs on Weds 10<sup>th</sup> February, after ESO personnel and scientists joined the vessel. Boat drills were conducted on the 13<sup>th</sup> and 15<sup>th</sup>, including gathering at the muster station and a briefing on deploying the

lifeboats. Daily meetings are being held at 10:00 between ESO, Bluestone and the vessel's Master to discuss any HSE / drilling concerns.

One member of ESO personnel slipped on the 16<sup>th</sup> due to drilling mud on the aft deck walkway – no medical treatment was required. Procedures have been put in place to prevent this happening again, and the situation will continue to be monitored.

There have been four whale sightings, thought to be Minke, this week on the 14<sup>th</sup>, 16<sup>th</sup> and 17<sup>th</sup>. All sightings have been reported to GBRMPA, and JNCC Marine Mammal Recording Forms completed.

## **5. Figures**

On next two pages:

**Figure 1** – Recovery and depth plot at Holes M0030A – M0033A

**Figure 2** – Breakdown of hours up to 2400 hrs on 12<sup>th</sup> February. No contractual implications can be made from this summary.



IODP Expedition 313 - Breakdown of hours

