Week 7 Drilling and Scientific Report for IODP/ICDP Expedition 364 Chicxulub Impact Crater 2016

21st May 2016 –28th May 2016

1. Operations

The week began on 21st May with coring continuing from the previous day and progressed without any interruptions. Cores were of excellent quality and 100% recovery was achieved. The day ended at a depth of 1166.19 mbsf, having drilled 44.50 m and collecting 15 cores.

The satisfactory coring rate continued throughout the 22nd May; cores were of excellent quality and close to 100% recovery (99.53%) was achieved. The day ended at a depth of 1215.24 mbsf, having drilled 49.05 m of core (16 individual cores).

On 23rd May, coring continued from the previous day and progressed uninterrupted throughout the day. Cores were of excellent quality and 100% recovery was achieved. The day ended at a depth of 1255.54 mbsf, having advanced the hole by 40.30 m, and a total of 13 cores were collected.

Coring continued from the previous day and progressed throughout the 24th May. The 12 cores collected were of excellent quality and 100% recovery was achieved. The day ended at a depth of 1291.29 mbsf, having advanced the hole by 35.75 m. Marco Coolen left the science party.

On 25th May, there were no operational issues and coring proceeded continuously. The day ended at a depth of 1328.49 mbsf, having advanced the hole by 37.20 m. A total of 12 cores were collected, all of excellent quality and 100% recovery.

The final cores of Expedition 364 were collected on the 26th May. The 2 cores collected were of excellent quality and 100% recovery was achieved, with a final expedition hole depth of 1334.69 mbsf, having advanced the hole by 6.20 m since midnight. Following this, the hole was flushed with water and pipe was pulled in preparation for the downhole logging activities. Downhole logging activities commenced and proceeded throughout the day, with tools used to collect data on resistivity, gamma ray, sonic velocity, magnetic susceptibility and temperature. Two imaging tools were run to obtain acoustic and optical images of the borehole. In parallel with the logging activity, the airgun for the VSP exercise was tested; MMO personnel were in place for the pre-watch and for the full duration of the exercise.

The day of 27th May began with a continuation of downhole logging activities, with spectral gamma ray and optical imaging being run downhole. Following the completing of logging of the lower section of the hole, pipe was tripped and logging of a midsection (~700 – 940 mbsf) commenced. This logging activity continued throughout the day and into the next, with various tools being deployed included resistivity, gamma ray, sonic velocity, magnetic susceptibility and temperature. Two imaging tools were run to obtain acoustic and optical images of the borehole. In the late afternoon, the remaining scientists disembarked the *L/B Myrtle*, along with the Barcroft film crew.

Downhole logging continued for the duration of the early morning on the 28th, followed by VSP set up and data acquisition. By early afternoon, all scientific and operational activities had ceased and demobilization activities began.

2. Hole summary

Hole	M0077A
Latitude	21°26.996' N
Longitude	89°56.968'W
First core	234R
Last core	303R
Cores recovered	70
Drilled length (Coring)	213.00 m
Drilled Length (Open Hole)	0 m
Recovered length	216.88 m
Depth in hole	1334.69 m
Hole recovery	100%

3. Science

4.

For the first three days of the week (21st – 23rd) we continued in granite, and encountered a variety of small dikes of various compositions and appearances, with subtle changes in physical properties. As the week progressed we encountered more dikes and for the last few days of drilling (24th – 25th) we recovered a complicated sequence of melt and melt breccia. This sequence has some physical properties that are different to the previous melt and melt breccias found further up the hole. In the early hours of the 26th, we transitioned back into granite before we finished drilling at 1334.69 m total depth.

On the 26th May, wireline logging tools were run from the bottom of the hole (1334.68 mbsf) to ~940 mbsf. Initially, the electrical resistivity too was run, followed by a tool string comprising the gamma ray, sonic and borehole fluid probes. The acoustic borehole images, caliper and spectral gamma ray logs were successively acquired. All data are of good quality. Borehole images allow to image the faults in the formation and provide their orientation with respect to the magnetic north.

Downhole logging operations proceeded throughout the 27th May, with the acquisition of gamma ray, caliper and optical images from ~1046 mbsf to ~940 m, as the elevated bottom hole temperature inhibited the tool from working properly at depth. Following the tripping of pipe, wireline operations proceeded with the acquisition of the electrical resistivity logs, followed by a tool string comprising the gamma ray, sonic and borehole fluid probes. Centralized tools were not run across the interval at which the mud was lost (~940 m) in order to avoid destabilising the borehole wall. The third acquisition consisted of the gamma ray, caliper and acoustic imager tool string. At ~850 mbsf, it was noticed that the borehole diameter expanded beyond the size of the centralizers used. The tool string was pulled back to the deck and centralizers changed to larger ones. In the meantime, the magnetic susceptibility and induction standalone tool was run. The tool string containing the acoustic imager was sent downhole again to image the ~940-700mbsf interval. A tool string comprising the gamma ray and the fluid temperature probe was then sent to the bottom of the hole where the recorded temperature was 66°C. All data are of good quality.

Downhole logging operations continued on the 28th with the acquisition of gamma ray and optical imager. The tool string was back to the surface at 6h30 and the rig up for VSP started. The VSP tool was sent to the bottom of the hole. Acquisition was finished at 13:40 and the logging operations ended with once the rig down was completed at 17:00. Except for the optical images, all data are of good quality.

5. HSE Activity

N/A

6. Outreach Activity

Expedition participants continued to blog at;
https://esoexpedition364chicxulubimpactcrater.wordpress.com/

ESO outreach facebook page was frequently updated; for the week of 14th – 20th May, **15,122** people were "reached", with **210** "page views". Since the start of Exp 364, the page has received **459** "likes".
https://www.facebook.com/ESO-outreach-305621560212/

Barcroft film crew were again on board the *L/B Myrtle* from the 25th – 27th May, filming the final stages of the offshore phase of the project for a documentary.

7. Figures

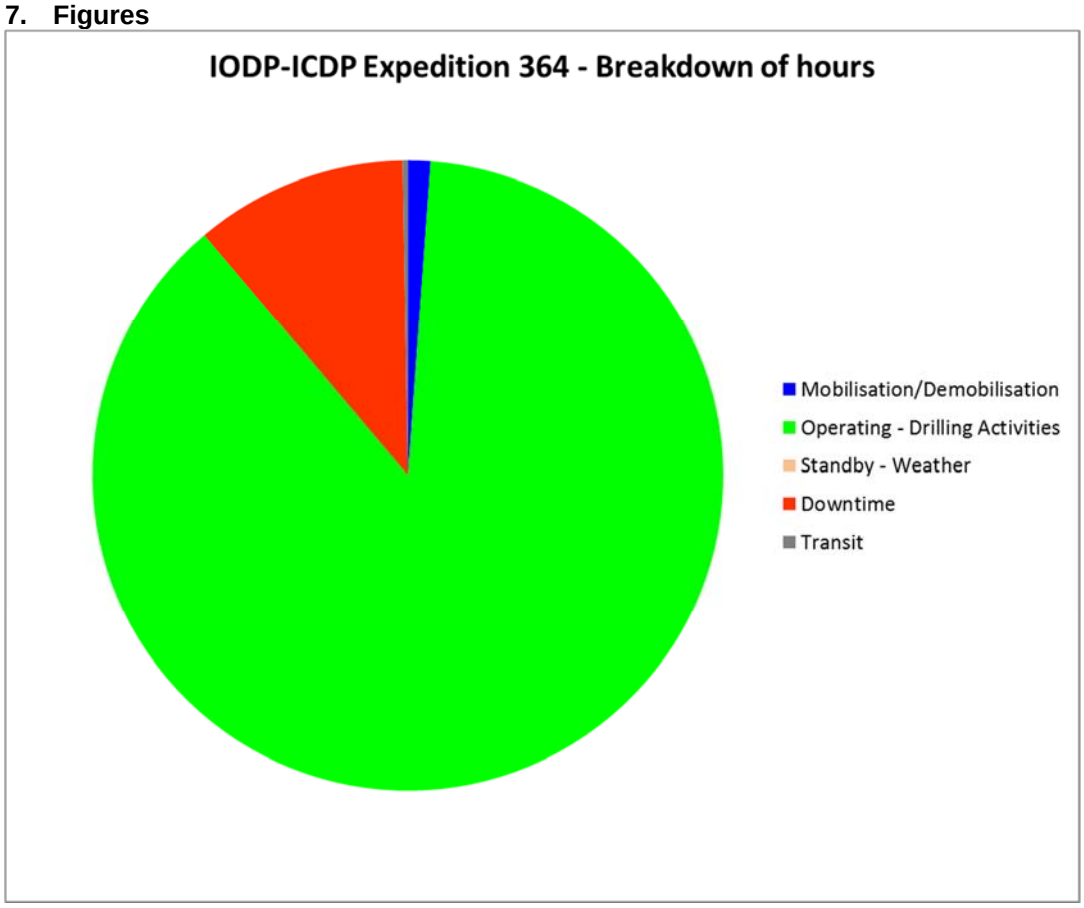

Figure 1: Breakdown of hours from 00:00 April 5th to 24:00 May 28th.

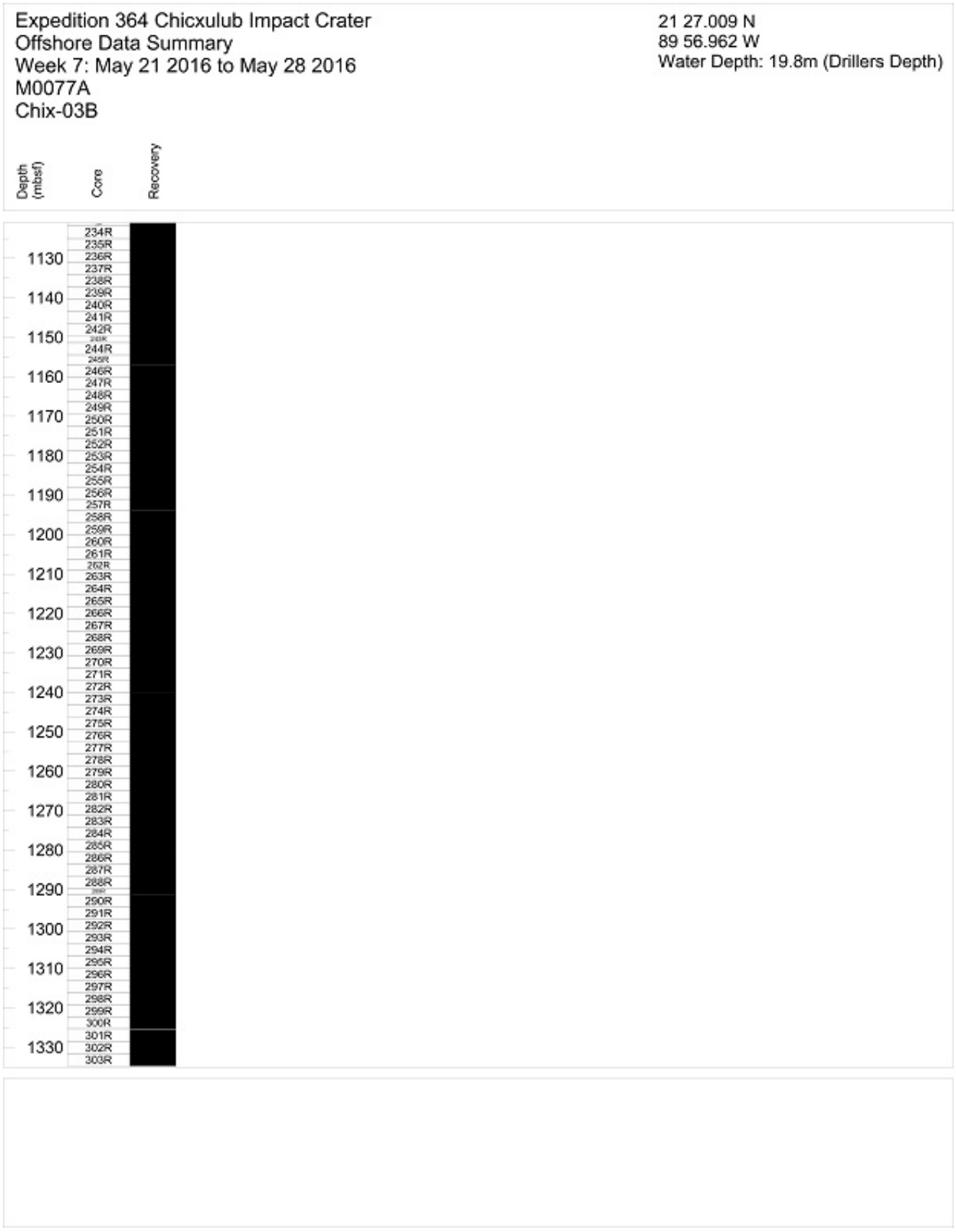

Figure 2: Core Recovery during operations from 00:00 May 21st to 24:00 May 28th

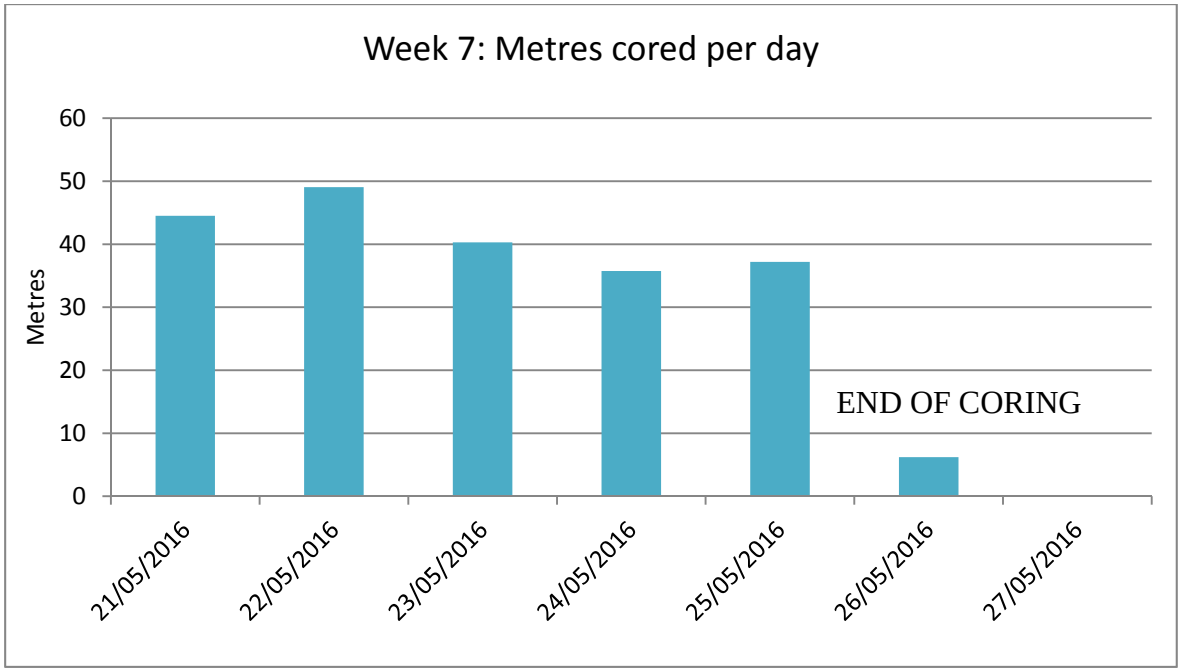

Figure 3: Week 7 coring rates.

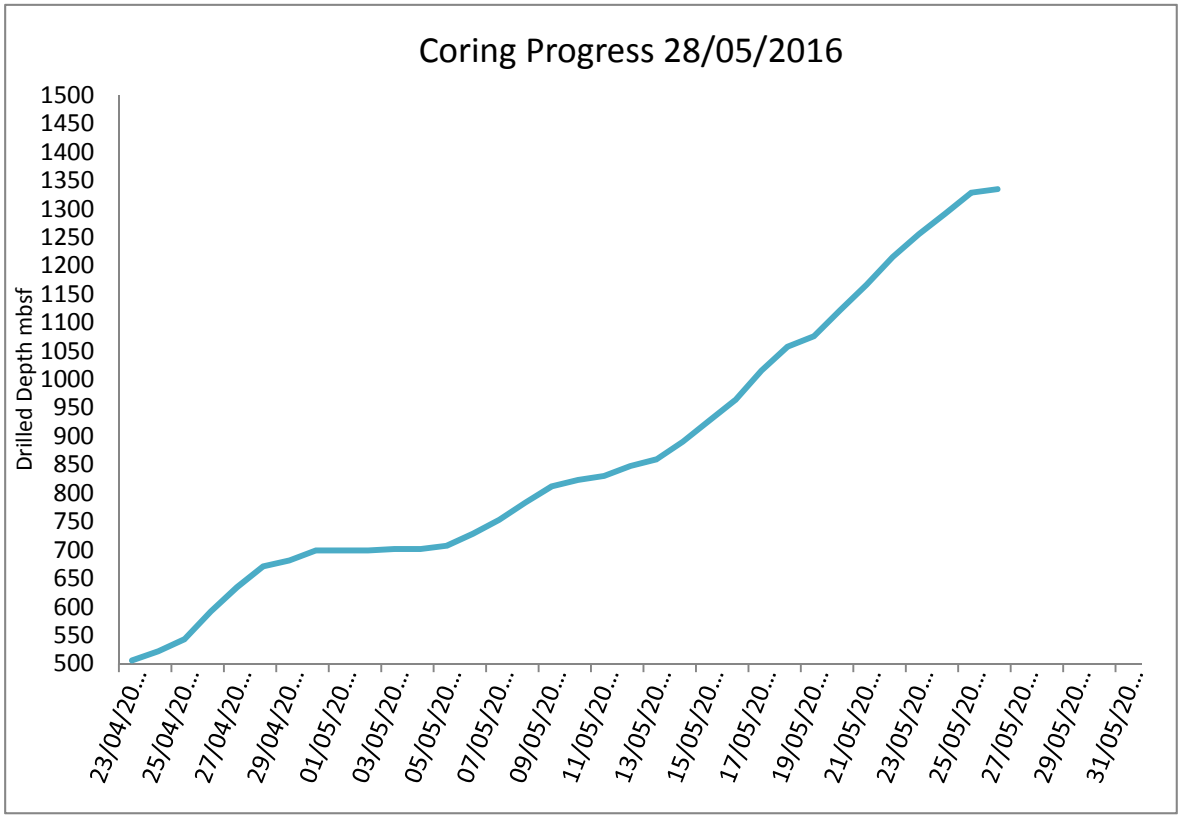

Figure 4: Coring progress at end of week 7, May 28th.

8. Photographs