

**Weekly Coring and Scientific Report for IODP Expedition 389
Hawaiian Drowned Reefs 2023**

6th October 00:00 – 12th October 24:00
All times in HST Hawaii Standard Time (UTC -10)



1. Operations

Four boreholes were completed or started during the week; one hole (M101B) was completed to depth with one (M102B) abandoned for technical reasons, a third (M102C) achieved a depth of 73.44 mbsf with an excellent 79% recovery. M102C was a fantastic borehole that was received with a high degree of celebration and excitement. The last borehole (M103A) is still being cored. This hole differed to the others in the upper section as there were good run lengths, unfortunately as we progressed these became shorter and so we have used more barrels in this section than expected.

The seafloor corer was more reliable this week with a much reduced total of technical downtime which was well received by all onboard. The corer was also on the sea bed twice for around 3 days, which is a marked improvement in reliability from previous weeks. There was also less on-deck time for repairs and any deck time was mostly for core barrels removal and to conduct general maintenance. Much of the downtime recorded this week in the time breakdown was reimbursement for earlier problems.

2. Completed hole summary

Hole	M101B	M102B	M102C
Latitude	20.273832	20.289949	20.289871
Longitude	-155.489799	-155.650945	-155.65008
Cores recovered	27	0	33
Drilled length (Coring)	28.33 m	0 m	53.55 m
Drilled Length (Open Hole)	16.82 m	4.7 m	19.89 m
Recovered length	26.44 m	0 m	42.32 m
Depth in hole	45.15 m	4.7 m	73.44 m
Hole recovery %	93 %	N/A	79 %

3. Science

We returned to KOH-02A (H7 reef, -938 m) to deepen the hole now designated M101B. We cored to 5 mbsf and recovered a similar sequence of volcanoclastic layers at the top, underlain by several meters of corallgal boundstone characterized by platy to foliaceous morphologies likely representing Agariciidae corals. We then washed to a depth of ~ 17 mbsf and once again began coring and recovered about a 10 m sequence of corallgal-microbiolite boundstone and corallgal boundstone, with increasing branching to submassive *Porites* corals in the deepest cores. In section 19 we were able to capture the direct contact between the H7 reef and the basement basalt at about 28 mbsf. We then recovered a 17 m thick sequence of basalts that preliminary observations indicate is composed of 4-5 different basalt flow units marked by significant changes in alteration, vesicularity and other textural features.

We transited back to KOH-01A (H2 reef, -412m) to deepen the hole. The seafloor corer had a problem with a sensor and M102B was abandoned after 4.7 m. We then successfully washed to ~ 20 mbsf to begin coring at M102C. After slow coring between ~ 21 to 35 mbsf, coring advanced quickly reaching a final penetration of 73.4 mbsf – a record so far for Expedition 389. At M102C, we recovered a spectacular 50 meter sequence of corallgal and corallgal-microbialite boundstones, with locally well developed crustose coralline algal crusts and varying amounts of dark volcanoclastic sediments filling the internal cavities. Also notable in M102C was the dominance of submassive, columnar and massive *Porites*, including numerous large colonies between 1-2 m in length with apparently well-preserved skeletons and clear growth banding orientation toward the top of the core. The bottom section (32) of M102C is corallgal boundstone, composed mainly of branching *Porites* with abundant fine to coarse, brownish sediment with visible bioclasts, in contrast to the main reef sequence above.

During week 6, interstitial pore water samples have been extracted from Holes M101B, M102C and M103A.

Logging of cores from M101B was completed this week and cores from M102C are in the process of being logged. By midnight on October 6th, 26 sections of M102C had been run through the multi-sensor core logger (MSCL), which measures natural gamma radiation, magnetic susceptibility, resistivity, density and P-wave velocity. M101B cores contained high amounts of debris at shallower depths but became increasingly more competent towards deeper depths. Just over 55% of the core passed QA/QC. Similarly, M102C sections 1 through 13 contained relatively high amounts of debris and gaps. Less than 40% data acquired passed QA/QC. Deeper cores, however, became significantly more competent in nature and data retention jumped to 72 - 91%. As all the cores were drained, the contact gap between transducers in the core prohibited transmission and measurement of P-waves.

4. HSE Activity

Daily toolbox talks take place with the contractor at 11:30 for the outgoing night shift and at 23:30 for the outgoing day shift.

The weekly deck walk was undertaken on Saturday 7th October by the ESO Operations Manager and vessel and contractor staff.

On Sunday 8th October, weekly safety meetings were attended at 11:00 for the day shift and 13:00 for the night shift. HSE matters over the past week were reviewed and the onboard medic discussed manual handling and musculoskeletal injuries.

ESO has initiated a card system (ESO Work Observation Card) to allow participants to report H&S concerns, as well as positive actions by colleagues and the wider ship community. These cards augment the system managed by the vessel and contractor. Comments are shared anonymously at daily meetings and actions taken to resolve any concerns raised. The system has been well received by ESO staff and the science party. For the week between 6th October and 12th October, 3 cards were collected (1 positive comments and 2 hazard), all have been closed out. Staff were encouraged to keep completing the forms as they are important to improve our safety on board the vessel and ESO operations in the future. Positive behaviour comments are also welcome.

5. Outreach Activity

During week 6, three new blog posts were uploaded to the expedition blog site located at <https://expedition389.wordpress.com/>: 'A Piece of Time' (7th October), 'The Bright Lights' (8th October), and 'A Conversation with Ana Prohaska' (11th October). In Week 6, there were 796 views of the expedition blog site and it is being followed in 58 countries, an increase of 4 from last week. Posts have also been uploaded to the social media platforms X and Facebook over the past week. Daily reports from 6th October to 12th October have been released to the ECORD JISCMail distribution list and posted on the ECORD Expedition 389 webpage.

The Co-Chief Scientists Christina Ravelo and Jody Webster participated in a well-received ship-to-shore event with the IODP Forum/ANZIC PMO meeting on 12th October (HST). They gave a summary of the science and progress of the expedition so far and took questions from the audience.

6. Figures

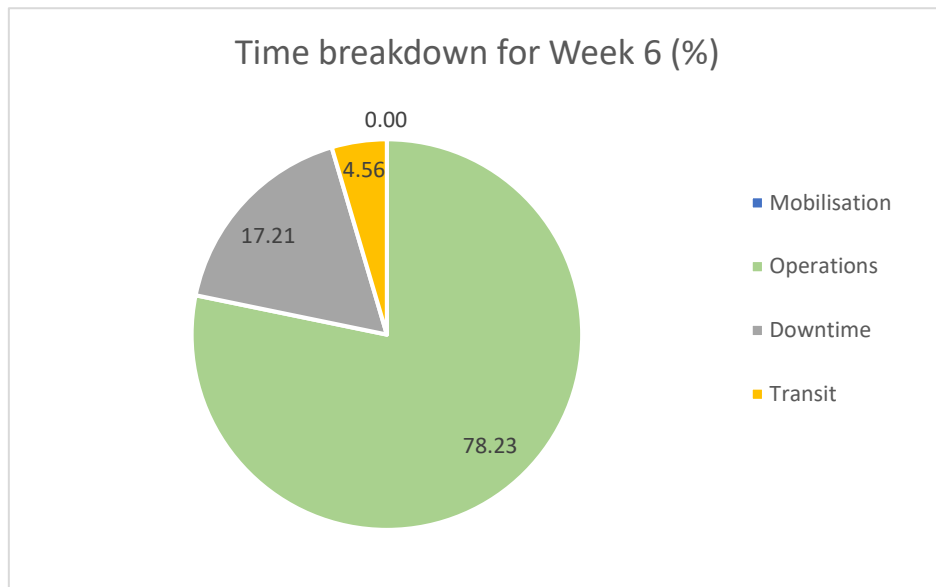


Figure 1: Breakdown of hours during Week 6 from 00:00 on 6th October to 12th October 2023 at 24:00. Much of the downtime recorded this week in the time breakdown was reimbursement for earlier problems.

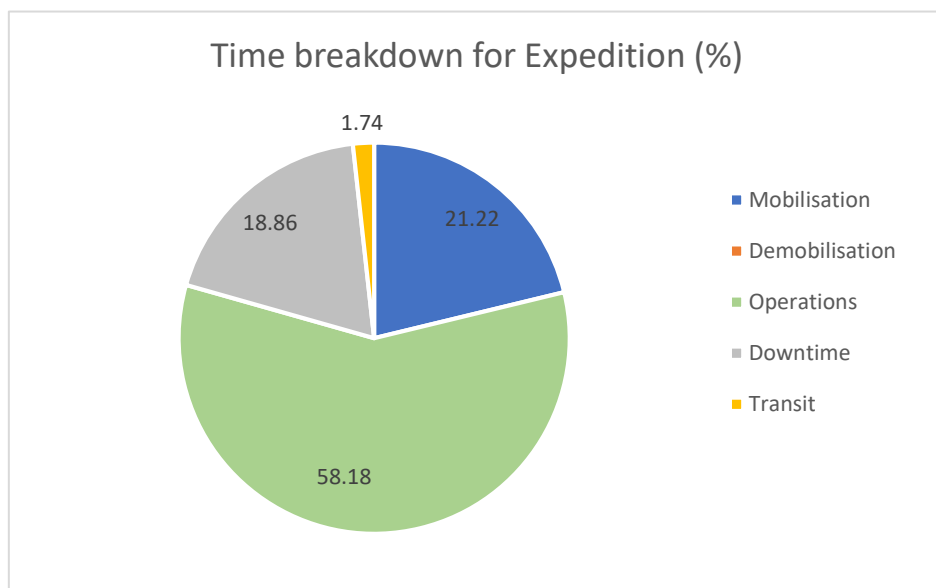


Figure 2: Breakdown of cumulative Expedition hours from 31st August 2023 at 17:50 to 12th October 2023 at 24:00.

7. Photographs



Clockwise from top left. The contact representing the initiation of reef growth on basement in M101B. From left to right: Luzie Schnieders and Jody Webster. Photo by HannahGrant @ECORD_IODP. All core barrels stacked up prior to on-deck curation for Hole M102C. Photo by JodyWebster@ECORD_IODP. Getting some Vitamin D in during a break from on deck core curation. From left to right: Luzie Schnieders, Marisa Rydzy and Nancy Prouty. Photo by MaryMowat @ECORD_IODP. Volcanoes at sunset. Mauna Loa (L) and Mauna Kea (R). Photo by HannahGrant@ECORD_IODP.