

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

20th October 00:00 – 26th October 24:00
All times in HST Hawaii Standard Time (UTC -10)



1. Operations

An excellent week for the seafloor corer with 6 full days of 24 hour operations and four boreholes completed; 114 m cored and a combined recovery rate of almost 70%.

The week began with difficulties in borehole M99G, a recurring theme not just for the week but the expedition, however problems were overcome and by midnight on the 20th October we were over 37 mbsf. Much of the following day was given over to borehole management and by midnight on the second day we were at a depth of 53.22 mbsf. M99G was becoming tight and with a long time required to make it stable, it was decided to terminate the borehole at 68.72 mbsf and with one barrel remaining. The corer was recovered to deck 1 hour short of 4 full days in the water. A short schedule of maintenance allowed the corer to be deployed again very quickly and M107A was spudded in just before midnight whilst the curation of the cores for M99G continued.

The large number of cores from M99G kept the curatorial and database staff busy until late afternoon on the 24th October when not long after, M107A was ended by ESO while in a sequence of basalt and the corer recovered to deck. A transit to MAH-02B was undertaken and coring in Hole M108A commenced in difficult ground. Unfortunately, after only 6 short runs totaling 1.97 mbsf, a mechanical problem with the corer was noted and it was brought back to deck to repair. A quick turnaround allowed it to be deployed at M108B and cored to 5.05 mbsf before midnight.

The whole of the 25th October and part of the 26th were spent on M108B which terminated at 30.70 mbsf. Two short sections were washed to allow casing to be set and improve the condition of the hole. This was successful and longer runs were gained immediately following this operation. By the end of this weekly report period, the hole has not yet been fully curated so is not included in the tables below. The week finished with a transit to MAH-04A (Site M109) whilst repairs and maintenance on the seafloor corer were undertaken.

2. Completed hole summary

Hole	M99G	M107A	M108A
Latitude	19.835295	19.940184	20.048363
Longitude	-156.092467	-156.058177	-156.192745
Cores recovered	31	8	6
Drilled length (Coring)	38.21	13.44	1.97
Drilled Length (Open Hole)	30.05	N/A	N/A
Recovered length	18.93	12.72	1.95
Depth in hole	68.26	13.44	1.97
Hole recovery %	49	95	99

3. Science

At M99G, after washing down to about 30 mbsf, we recovered a reef sequence composed of algal boundstone, corallgal boundstone and corallgal microbiolite boundstone down to 42 mbsf. From 42 mbsf to 48 mbsf, we recovered corallgal boundstone before drilling into basalt. Although there were some disturbed intervals, and incomplete recovery, there were numerous intact sections of reef framework with what appear to be well preserved corals. Basalt was recovered from 48 to 66 mbsf, with a few thin volcanoclastic intervals, as well as bioclastic rich sediments in some cavities. Within this basalt dominated section, several cores runs (21R, 22R, 28R) recovered no material, indicating along with white carbonate material observed falling from the barrels during operations, that we likely cored through unlithified sands. Core runs R30 and R31 recovered only small sections of basaltic material as the polycarbonate liners were deformed during coring.

At M107A, we recovered 1.5 meters consisting of an interval of mixed carbonate and volcanoclastic material overlying a thin interval of corallgal boundstone which included several in situ corals. From 1.5 mbsf to 13.77 mbsf, we recovered pillow basaltic rock. Thick crusts of crustose coralline algae and then an encrusting coral were observed directly colonizing the uppermost basalt contact at 1.5 mbsf.

At M108A, we drilled a short hole that was terminated due to mechanical issues. That hole had just under 2 meters of corallgal boundstone that was highly disturbed. We redeployed the coring system and started M108B by washing down to 2 mbsf. We recovered a 29 meter section of corallgal boundstone with mainly branching but also laminar coral forms, and with varying amounts of microbialite and in some cases bioclastic infilling. Although there were intervals that were highly disturbed, there were also intervals of in situ coral reef framework.

During week 8, interstitial pore water samples have been extracted from Holes M99G and M107A. Interstitial water sampling was not possible from Hole M108A due to the type of material recovered.

Cores from Sites M99G and M107A were logged with the Multisensor Core Logger (MSCL) which measures natural gamma radiation, magnetic susceptibility, resistivity, p-wave velocity, and gamma density. As all the cores were drained, the contact gap between transducers in the core prohibited transmission of p-waves. The core sections contained varying amounts of debris and other drilling-induced damage. Sections made up completely of loose rubble were not run. This was the case for all core sections recovered at Site from M108A which consisted solely of drilling-induced debris. The fraction of data that passed the QA/QC process for each site are listed below.

Site	Cores Recovered #	Recovered m	Cores MSCL Logged #	MSCL Logged m	QA/QC Passed %
M99G	31	18.93	19	16.27	53
M107A	8	12.72	6	12.35	84
M108A	6	1.95	0	0	N/A

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 21st October by the ESO Operations Manager and vessel and contractor staff.

On Sunday 22nd 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 how to keep wounds clean and prevent infections.

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 20th October and 26th October, only 1 card with a request for action was submitted and this has 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 8, one new blog post was uploaded to the expedition blog site located at <https://expedition389.wordpress.com/>: 'Communicating Science Offshore' (20th October). In Week 8, there were 563 views of the expedition blog site and it is being followed in 65 countries, an increase of 4 from last week. Posts have also been uploaded to the social media platform X over the past week. Daily reports from 20th October to 26th October have been released to the ECORD JISMAIL distribution list and posted on the ECORD Expedition 389 webpage.

The EPC (European Petrophysics Consortium) team of Marisa Rydzy and Andrew McIntyre undertook a ship to shore with the School of Geography, Geology and Environment at the University of Leicester. Twenty five attendees heard about life on the ship and about the Expedition 389 science. This also included a tour of the back deck with an introduction to the night shift science party, the galley and the bridge of the MMA Valour.

6. Figures

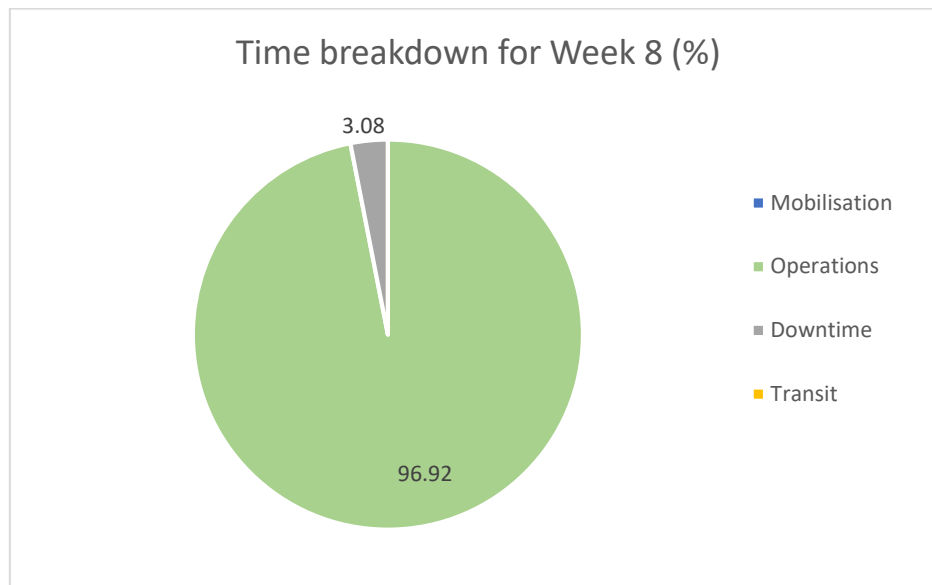


Figure 1: Breakdown of hours during Week 8 from 00:00 on 20th October to 26th October 2023 at 24:00. Much of the downtime recorded this week in the time breakdown was reimbursement for earlier problems and includes a small amount of transit.

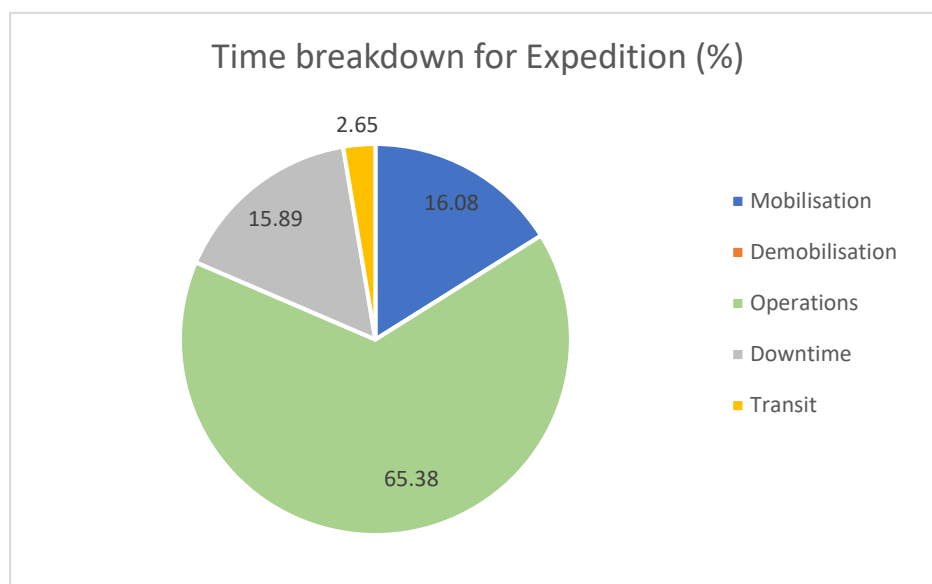
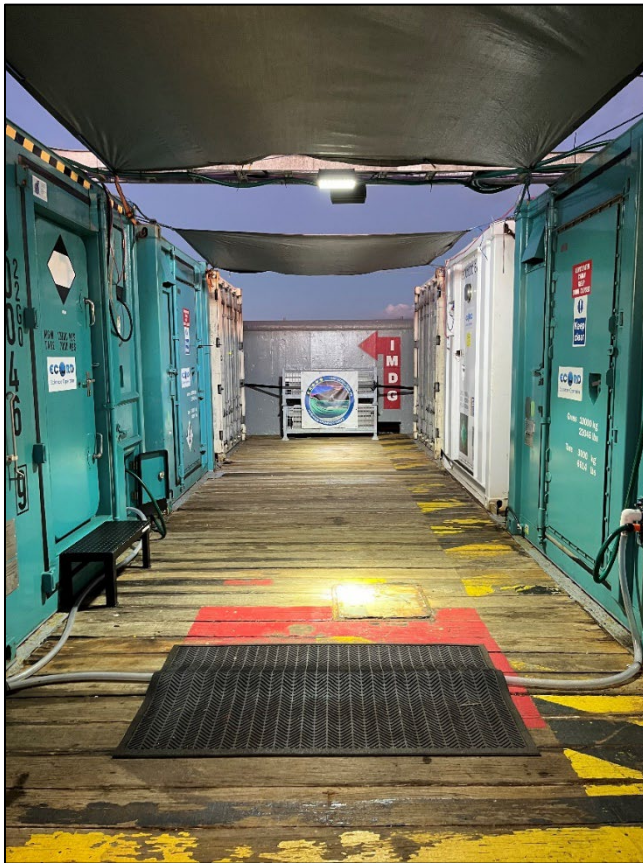


Figure 2: Breakdown of cumulative Expedition hours from 31st August 2023 at 17:50 to 26th October 2023 at 24:00.

7. Photographs



Clockwise from top: A complete double ānuenue (rainbow) right after sunrise west of the island of Hawaii. As one of our science party members states, Hawaii has a lot of rainbows, but few are as spectacular as a complete and stunningly beautiful double rainbow in front of the horizon. Photo by KennaRubin@ECORD_IODP. Co-Chief Scientist Jody Webster with fascinating core from Hole M99G after on-deck curation. Photo by HannahGrant@ECORD_IODP. A quiet dawn on ESO Main Street with coring of Hole M99G into a fourth day. Photo by HannahGrant@ECORD_IODP.