

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

**29<sup>th</sup> September 00:00 – 5<sup>th</sup> October 24:00**  
**All times in HST Hawaii Standard Time (UTC -10)**



## **1. Operations**

After 12 hours extra in port, the vessel sailed from Barbers Point at 06:32 on 29<sup>th</sup> September. Following examination of the weather forecast, it was decided to core a site on the leeward side of the Big Island of Hawaii.

Unfortunately during wet tests, it was discovered that additional repairs had to be made to the corer and so deployment on what was to become the MSP 100<sup>th</sup> site was delayed slightly. The corer was working well and M100A being advanced at a good rate with 12.43 mbsf achieved, when the vessel lost contact with the DGPS satellites and therefore DP. Due to the quick reactions of bridge officers and corer operators there was no damage to either the vessel or corer. Investigations were initiated to determine how and why this happened and operations were suspended until it could be certain this would not happen again.



During this time, we moved to the work area on the windward side of the island as the weather forecast an extended period of good weather, and then stood by for about 12 hours waiting for the corer operator to resolve the issues that led to losing DP at the last site. Having received assurances that mitigations were set in place to sufficiently reduce the risk to the vessel and seafloor corer following failure of the DGPS, operations re-commenced and the corer was deployed at site KOH-02A (Site M101). Progress was very slow with small runs and was completed when all core barrels on the corer were used at a depth of 18.09 mbsf. Whilst the core barrels were recovered from the seafloor corer the vessel transited to the next site, KOH-01A.

A quick turnaround of the seafloor corer allowed borehole M102A to be started in less than 12 hours. Progress on borehole M102A was good, with long core runs, reaching 26.07 mbsf. Unfortunately, a hydraulic failure was identified and the system shut down to avoid damage to the corer. This required another recovery to deck for repairs which were achieved whilst the core barrels were removed. The core barrels were being offloaded from the seafloor corer, extruded and curated by time Site M101 was re-occupied following repairs to the seafloor corer and transit to location. The corer was deployed and lowered to 10m above the sea bed from where, as usual, the sea bed was checked for biota and on two occasions the landing was aborted due to sea bed fauna. Borehole M101B commenced by coring the upper 5 metres or so followed by wash boring to 16.94 mbsf with casing set at 13 mbsf. At midnight on the 5<sup>th</sup>, 18.989 mbsf had been achieved with 18.5 m of casing set.

## **2. Hole summary**

Hole	100A	101A	102A	101B
Latitude	20.137606	20.273677	20.289982	20.273832
Longitude	-156.079107	-155.489902	-155.650867	-155.489799
Cores recovered	12	25	14	N/A
Drilled length (Coring)	12.34 m	18.09 m	25.14 m	7.25
Drilled Length (Open Hole)	N/A	N/A	N/A	11.73
Recovered length	9.73 m	12.34 m	11.08 m	N/A
Depth in hole	12.34 m	18.09 m	25.14 m	18.99
Hole recovery %	78 %	68 %	44 %	N/A

### 3. Science

After the port call, we arrived at site KAW-07A (H6 reef, -988 m). After the corer was deployed and retrieved due to a leaky manifold, we landed on the seabed on 29th September and drilled a 12.5 meter hole (M100A) before having to abandon the site due to the ship losing position. We recovered a thin, 16 cm, interval of corallgal boundstone at the top, and the remaining rock that was recovered was basalt with one interbedded 25 cm layer at 3.5 mbsf of consolidated sand-sized bioclastic and volcanoclastic material.

After waiting for operations to begin again, and transiting to KOH-02A (H7 reef, -938 m), we drilled a 18.2 meter hole (M101A) before recovery to deck after using all the core barrels. There is a thin volcanoclastic layer at the top, underlain by ~5 meters of corallgal boundstone, ~5-7 meters of corallgal-microbiolite boundstone, and then another ~5 meters of corallgal boundstone. The majority of the corals had platey to foliaceous morphologies likely representing Agariciidae corals, with fragments of branching *Porites* corals in the deepest cores. There were some well-preserved sections of in situ coral framework, but about half of what was recovered was heavily disturbed and fragmented during the coring process.

We transited to KOH-01A (H2 reef, -412m) and drilled a 25.1 meter hole (M102A) before termination of the hole due to the seafloor corer hydraulic failure. The recovered lithologies down to ~ 22 mbsf were unconsolidated and semi-consolidated dark gray medium sands composed of volcanoclastic and bioclastic grains supporting abundant coralline algal nodules throughout (rhodoliths). Below this coral algal boundstones were observed down to ~ 25 mbsf indicating we may have encountered the top of the H2 reef sequence.

Interstitial pore water samples have been extracted from Holes M101A and M102A. Interstitial water collection was attempted from Hole M99C, but no IW was recovered.

Cores from M100A, M101A, and M102A were run through the multi-sensor core logger (MSCL), which measures natural gamma radiation, magnetic susceptibility, resistivity, density and P-wave velocity. M100A and M101A contained exceptionally high amounts of debris and gaps. Thus, only roughly 49% and 15% of the acquired data passed QA/QC, respectively. The core consistency of M102A was more suitable for MSCL logging and 80% of the acquired data was retained. Even p-wave wave velocities could be measured in over wet unconsolidated sand in 2 sections (389-M102A-002R and 389-M102A-011R). Otherwise, the contact gap between transducers in the core as well as air bubbles prohibited successful transmission of P-waves in the remaining cores.

### 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 30<sup>th</sup> September by the ESO Operations Manager and vessel and contractor staff.

On Sunday 1<sup>st</sup> 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 stop bleeding.

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 29<sup>th</sup> September and 5<sup>th</sup> October 7 cards were collected (3 positive comments and 4 hazard), all but one 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 5, one new blog post was uploaded to the expedition blog site located at <https://expedition389.wordpress.com/>: 'The 100<sup>th</sup> Site' (3<sup>rd</sup> October). In Week 5, there were 673 views of the expedition blog site and it is being followed in 54 countries. Posts have also been uploaded to

the social media platforms X, Facebook, and Mastodon over the past week. Daily reports from 29<sup>th</sup> September to 5<sup>th</sup> October have been released to the ECORD JISMAIL distribution list and posted on the ECORD Expedition 389 webpage.

On 5<sup>th</sup> October, an open outreach meeting was arranged via Zoom for interested parties from Hawaii. The meeting invitation was distributed to individuals and networks who had expressed an interest in the project or who had asked for further information as to why the MMA *Valour* was operating in the waters off Hawaii. The Co-Chief Scientists Christina Ravelo and Jody Webster, Science Party member Kenna Rubin from the University of Hawaii, the EPM Hannah Grant, and the ESO Science Manager David McInroy were all present. One participant external to the project, a representative of the DAR was also present, but no other participants attended.

## 6. Figures

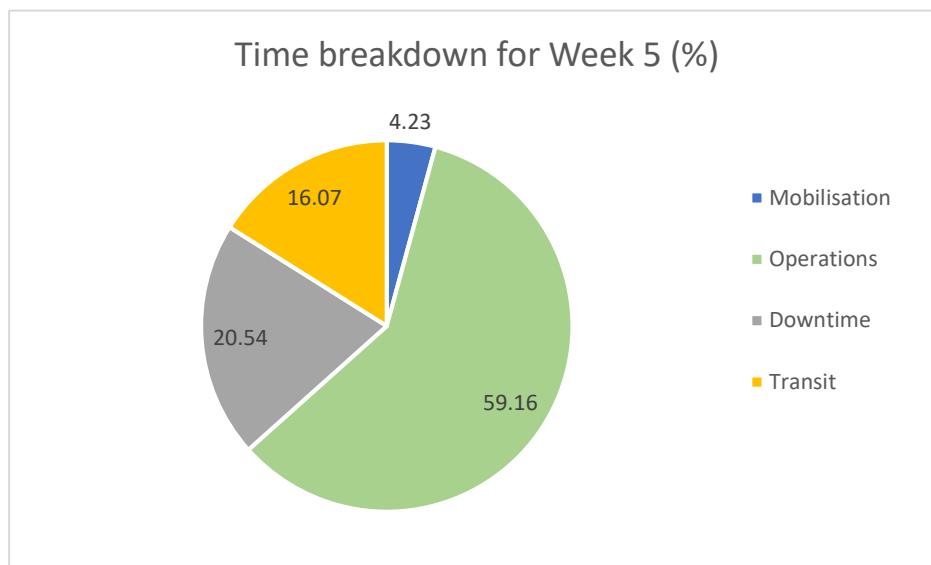


Figure 1: Breakdown of hours during Week 5 from 00:00 on 29<sup>th</sup> September to 5<sup>th</sup> October 2023 at 24:00.

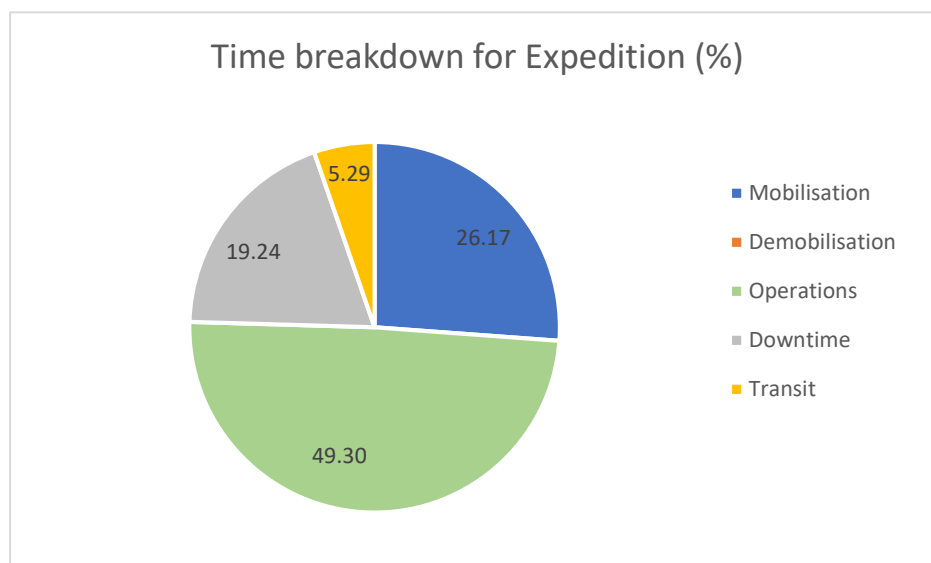
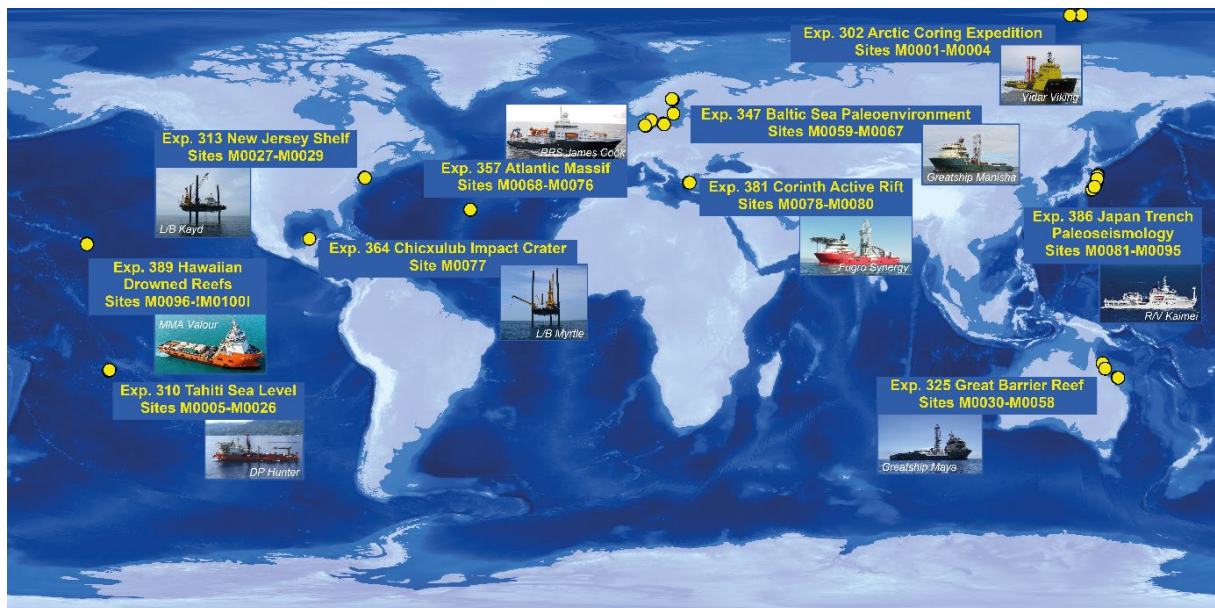


Figure 2: Breakdown of cumulative Expedition hours from 31<sup>st</sup> August 2023 at 17:50 to 5<sup>th</sup> October 2023 at 24:00.

## 7. Photographs



Day shift ESO Staff celebrating MSP Site M100! From left to right: Marisa Rydzy, Alex Wuelbers, Graham Tulloch and Mary Mowat. Photo by LuzieSchnieders@ECORD\_IODP. Night shift ESO staff celebrating MSP Site M100! From left to right: Patrizia Gepreags, Hannah Grant and Andrew McIntyre. Photo MaryMowat@ECORD\_IODP.



MSP expeditions and site locations between 2004 and 2023. The first MSP site was Site M0001 on Expedition 302 Arctic Coring Expedition (ACEX) on 15<sup>th</sup> August 2004. Site M100 commenced on 30<sup>th</sup> September 2023 during Expedition 389, Hawaiian Drowned Reefs. Image DavidMcInroy&HannahGrant@ECORD\_IODP.