

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

**22<sup>nd</sup> September 00:00 – 28<sup>th</sup> September 24:00**  
**All times in HST Hawaii Standard Time (UTC -10)**



### **1. Operations**

Almost 100 m was advanced this week in 4 boreholes and the week closed in port for our planned mid-way port call to replenish supplies, including food, water and fuel. A change of some contractor personnel and ESO crew including an ESO staff member who been doubling up working with the MSCL and part-time EPM, and our Outreach Officer. The expedition was unable to leave port as scheduled on 27<sup>th</sup> September, partially due to delays on the dockside, and had to delay departure from Barbers Point Harbor, Oahu by 12 hours, departing on the morning of the 28<sup>th</sup> of September instead.

Only 51% operational time was accomplished this week, mainly due to the port call and transit time involved, however the 26% downtime for the week remains disappointing. A recurring fault has been identified and repairs carried out. The team remain upbeat and focused on resolving the problems and delivering increased time off deck.

### **2. Hole summary**

Hole	M99C	M99D	M99E	M99F
Latitude	19.83435	19.83441	19.83524	19.83534
Longitude	-156.091	-156.091	-156.092	-156.092
Cores recovered	27	N/A	25	9
Drilled length (Coring)	38.31	N/A	31.62	13.45
Drilled Length (Open Hole)	N/A	27.71	N/A	N/A
Recovered length	25.50	N/A	18.00	6.75
Depth in hole	38.31	N/A	31.62	13.45
Hole recovery %	66.51	N/A	56.93	50.19

### **3. Science**

Work continued at the H1 reef terrace (KAW-02C) to core the upper sub-terrace at 132 m water depth, which should have a record of reef development during MIS1-5. M99C was drilled to 38.3 mbsf and M99D was an attempt to bore/wash to 0.5 meters above the bottom of M99C, but there were technical difficulties that forced termination of M99D before coring. The 38.3 m sequence of cores at M99C includes a well-developed sequence of, from top to bottom, corallgal-microbiolite boundstones, algal boundstones and more frequent intervals of microbiolite boundstones down to 22 mbsf, and below 22 mbsf, there are intervals of corallgal and algal boundstones with no microbiolite boundstone down to the bottom of the hole. This lithologic transition co-occurs with some evidence of diagenesis and bioerosion, which may be indicative of subaerial exposure. In all, combined with M99A/B, the 'drowned top' of the reef structure was recovered as well as a sequence of reef development prior to the drowning.

Moving NE to the deeper sub-terrace at 144 m water depth, samples were obtained from two holes: M99E was cored to 31.6 mbsf and M99F was cored to 13.5 mbsf, both had to be abandoned because of technical difficulties with the seafloor corer. At M99E, we recovered a reef structure dominated by corallgal-microbiolite boundstone and microbiolite boundstone above ~15 mbsf, and corallgal boundstone and algal boundstone below ~15 mbsf. M99F was cored to ~ 13 mbsf and recovered corallgal boundstone and then a well-developed algal-microbialite boundstone below ~ 7 mbsf, although the recovery at M99F was not as good as previous boreholes.

No interstitial pore water samples have been extracted from the cores as no unconsolidated matrices have been recovered to date.

Cores from M99C, M99E, and M99F were run through the multi-sensor core logger (MSCL), which measures natural gamma radiation, magnetic susceptibility, resistivity, density and P-wave velocity.

Most of the recovered core sections contained relatively high amounts of debris and gaps. Nonetheless, data acquired over roughly 51% of the core passed QA/QC. As all the cores were drained, the contact gap between transducers in the core prohibited transmission 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 23<sup>rd</sup> September by the ESO Operations Manager and vessel and contractor staff.

On Sunday 24<sup>th</sup> September, 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 HSE at the upcoming port call.

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 22<sup>nd</sup> September and 28<sup>th</sup> September only 3 cards were collected and 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 4, three new blog posts were uploaded to the expedition blog site located at <https://expedition389.wordpress.com/>: 'A Conversation with Stephan Jorry' (22<sup>nd</sup> September), 'Black Rocks and Bubbles' (27<sup>th</sup> September), and 'Outside the box' (28<sup>th</sup> September). In Week 4, there were 814 views of the expedition blog site and it is being followed in 53 countries, an increase of 10 countries in the past week. Posts have also been uploaded to the social media platforms X, Facebook and Instagram over the past week.

Science Party member Pankaj Khanna from IIT Gandhinagar gave an outreach webinar about Expedition 389 to approximately 60 students. Participants were primarily from three institutes in India: IIT Gandhinagar, KJ Somaya (Mumbai) and AMU (Aligarh). The webinar also included a live tour of the back deck ESO containers and inside the MMA Valour.

Daily reports from 22<sup>nd</sup> September to 28<sup>th</sup> September have been released to the ECORD JISCMail distribution list and posted on the ECORD Expedition 389 webpage.

## 6. Figures

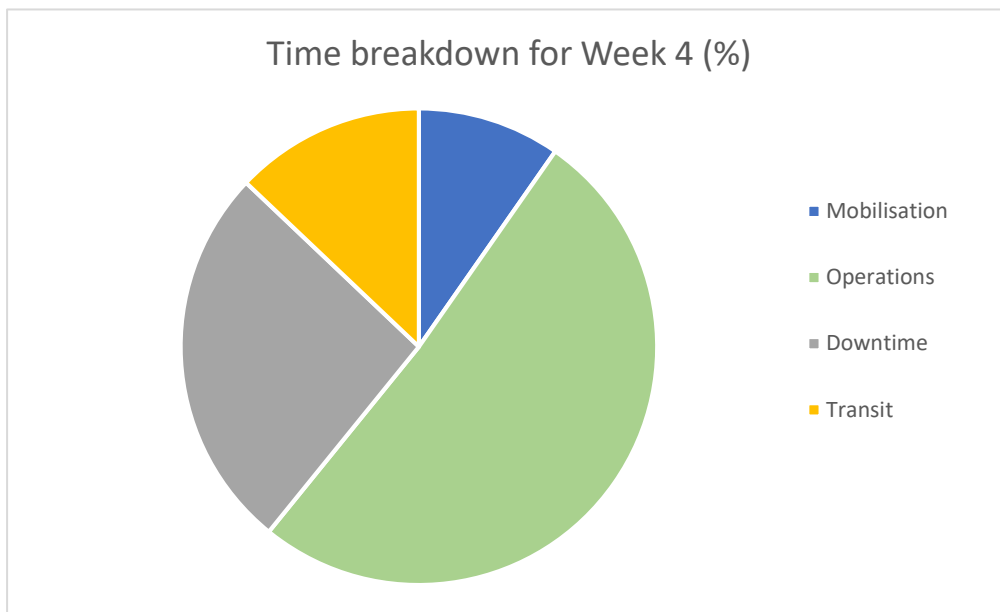


Figure 1: Breakdown of hours during Week 4 from 00:00 on 22<sup>nd</sup> September to 28<sup>th</sup> September 2023 at 24:00.

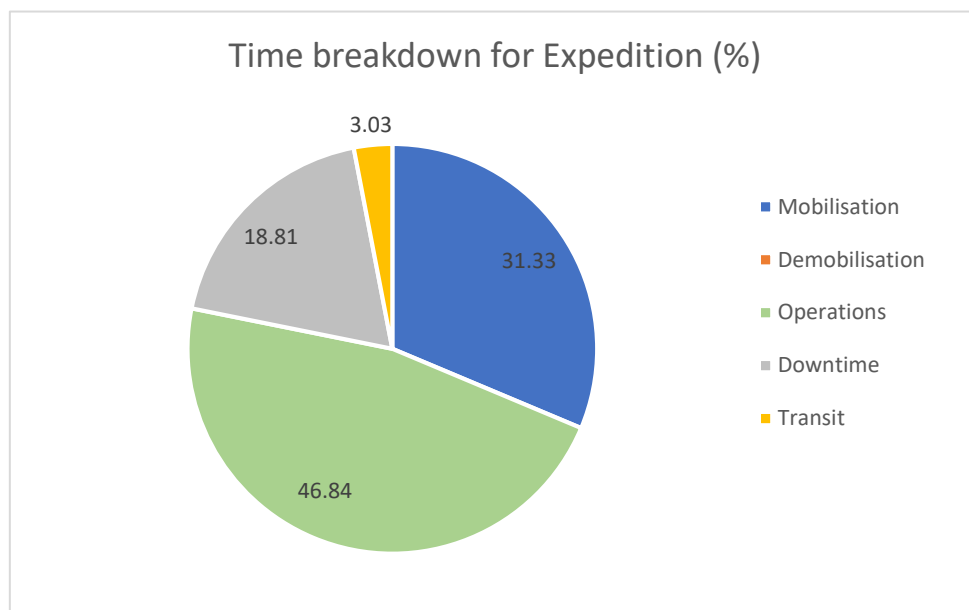
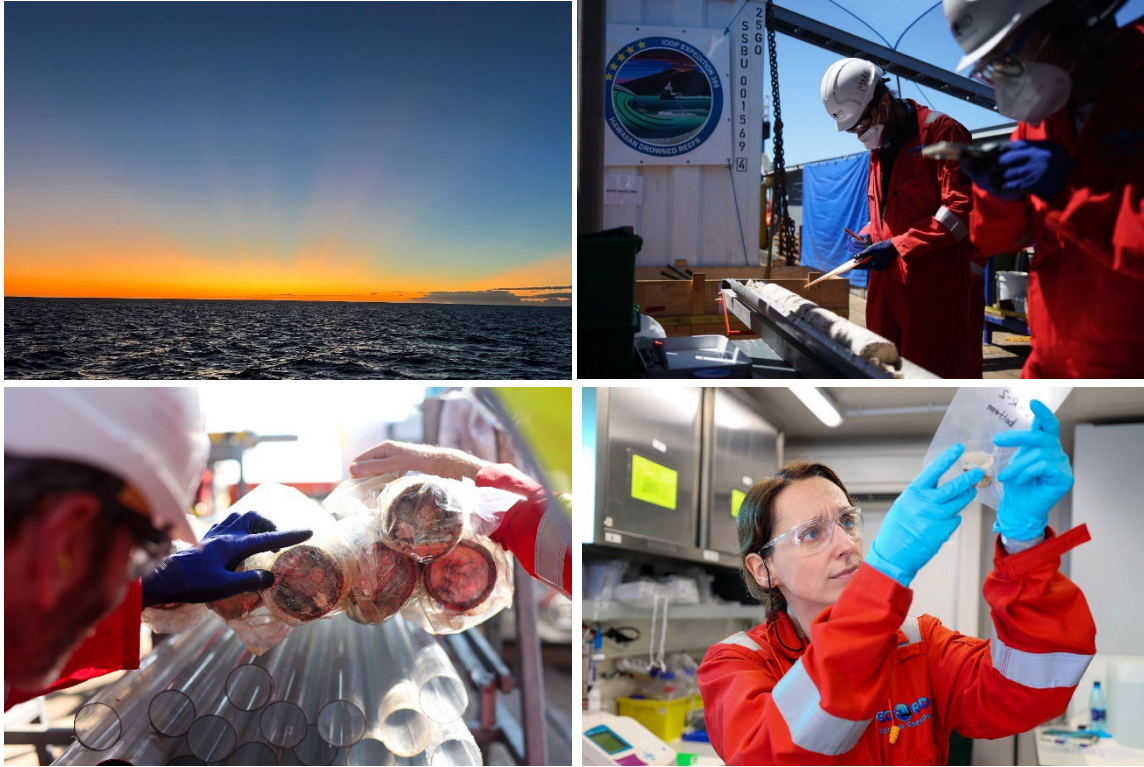


Figure 2: Breakdown of cumulative Expedition hours from 31<sup>st</sup> August 2023 at 17:50 to 28<sup>th</sup> September 2023 at 24:00.

## 7. Photographs



Clockwise from top left: Rays of light during sunset over the Pacific Ocean. Photo by HannahGrant@ECORD\_IODP. Coral Specialist Marc Humblet (L) and Sedimentologist Pankaj Khanna (R) undertaking an initial on-deck visual description of core. Photo by MarleyParker@ECORD\_IODP. Microbiologist Ana Prohaska examines a sample in the geochemistry lab. Core on deck prior to curation. Photo by MarleyParker@ECORD\_IODP.