

June 12 – June 20, 2022



Figure 1: The last lights of Hawaii.

After mobilization on June 12, which went very smoothly, we left our berth in Honolulu and crossed the port for re-fueling. Our departure from the fuel dock was delayed as the port was blocked for several hours due to operations involving a large barge. Around seven in the evening we finally left port (Fig. 1), heading toward the final station of leg one, which we re-occupied as the first station of leg 2. Before reaching our first station, shortly after noon on June 13 we carried out two shallow test dips along the way, to give both day and night teams the opportunity to become familiar with the CTD cast logistics and to take a first look at the sampling requirements for the bio casts. Both test dips went well, and we proceeded to our first station.

While the first full CTD cast (station 118) went very well, soon after it was discovered that the arm of the CAST6 winch system is leaking oil, which took it out of commission. Therefore, we switched over to the DESH5 winch (Fig. 2). The first two tries at collecting a profile with this system were both aborted due to communications issues between the fish and the CTD, which required the cutting off of 100m of CTD wire and re-termination. Additionally, the CTD platform track had to be removed from the deck to allow using a pallet jack to move the CTD between the hangar and the winch. The wooden pallet that we first used to shuttle the CTD disintegrated after a few casts, requiring a more stable platform to be fabricated out of metal.

Shuttling the CTD with this platform has worked very well and, after some practice, we are not losing more than a few minutes at either end of the profiles transporting the CTD. However, additional time is required with this winch because tag lines are required both for deployment and recovery.

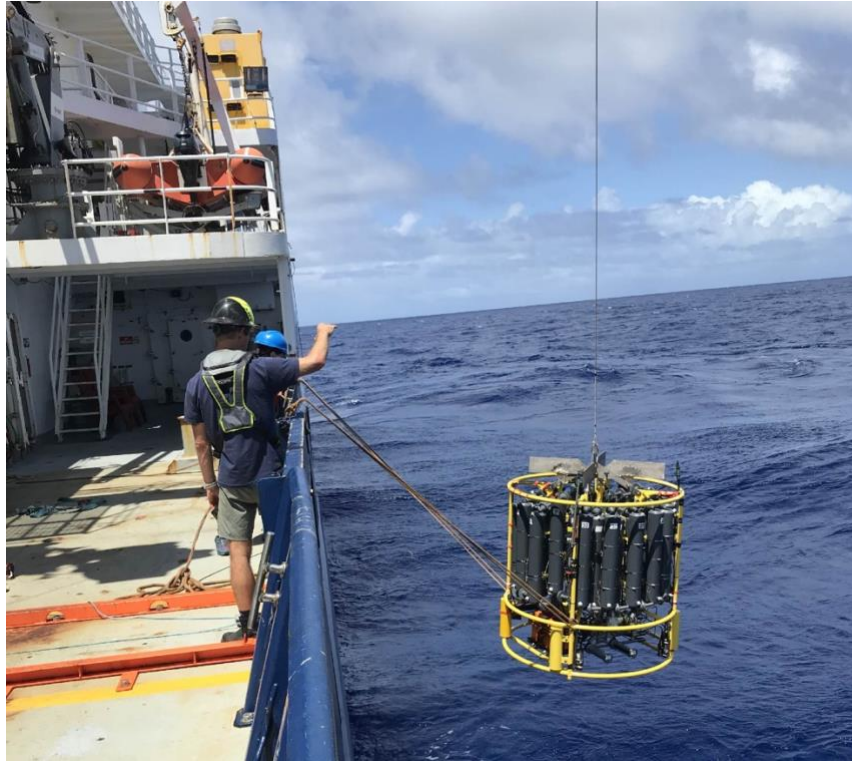


Figure 2: Early Deployment with tag lines – note the orange platform track that has since been removed.

More importantly, the ship has been using a very conservative 4000lbs tension limit for the DESH5, which has caused about 20 minutes delay on most stations because of the mistaken expectation that very slow winch speeds near the seabed are required to avoid any spikes above the tension limit. It has taken several days to determine that the CAST6 cannot be fixed at sea — - now that this has become clear we have finally been given permission to increase the winch speed near the seabed to a more reasonable 40m/min, which brings our cast times closer to the ones from leg 1. The increase winch speed has only a small effect on the wire tension, but we are still requesting an increase of the wire tension limit to 4500lbs, in order to be able to deal with heavier sea states.

In addition to the winch issue, we have been battling a few other technical problems. Most strikingly there have been many bottle failures, but fortunately we have mostly lost only a single bottle per cast. The bottle problems included several broken lanyards two of which happened during bottle cocking and caused bottle springs to shoot out from the bottles, which is not safe. One bottle we lost completely during a cast with the most likely explanation that the bottle closed accidentally during the downcast and was crushed when the water inside contracted due to the temperature decrease during the descent. Other bottle problems included insufficient

tension causing leaking, as well as one bottle lid catching a cable on the rosette while closing. For the last couple of days, we have not had any more bottle problems, so we are hopeful that those were teething issues.

A problem that has not been solved yet regards the flow-through system, which has been providing marginally sufficient flow to the PCO₂ system. Neither increasing the pumping power nor reducing the flow rate to the upstream bio flow-through system has solved the problem. Reducing the pressure relief of the system did improve the situation for a few hours but then the flow rate to the PCO₂ system crept back down to the same marginal rate as before. Our next step will be to install the spare diaphragm pump tomorrow morning — this has not been possible until now because the engineering department has been busy first with assessing and trying to repair the CAST6 winch and then with a problem affecting the bow thruster.

In spite of all these problems and delays we have been making good progress — we are now on station 131 and we have deployed one of our four floats. A benefit of the somewhat slower than expected speed of profiling has been the fact that the CFC group has been able to sample all the bottles from all core casts. An important contributor to our progress has been the excellent weather, with mostly very low sea state, lots of sunshine, a continuous refreshing breeze, and only the occasional rain shower. Thanks to the low sea state there have not been any significant issues with sea sickness. Because of this, the lack of any COVID-related issues, the excellent food, and the great company the crew and scientists are in excellent spirits.

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