

HOT-25: Chief Scientist Report

Chief Scientist: R. LUKAS

Personnel List

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Summary

HOT-25 was conducted on R/V ALPHA HELIX. ALPHA HELIX departed from Snug Harbor at 0930 HST on 8 April 1991, and returned approximately 1430 on 11 April. The return was one day early because the GOFs drifting sediment trap array was not deployed (see below).

The weather was very good, with light trade winds prevailing. There remained a swell from the previously strong trades, and the swell caused occasional excessive rolling of the vessel. This resulted in breakage of some gear, as detailed below.

With the major exception of the sediment trap deployment, the cruise achieved all other scientific objectives. A total of N CTD/rosette casts were made at station ALOHA, and 2 were made at the Kahe Point station. The GOFs primary productivity cast was made, and the in situ array successfully deployed and recovered. Several net tows were made for students working in the GOFs component of the program.

2 Problems

2.1 PITS spar buoy

A port-side deployment of the drifting sediment trap array was tried on HOT-25 instead of the stern deployment of HOT-24. During the final stage of the deployment of the array, the surface spar buoy swung into the side of the ship breaking off the weighted end. There was no means to repair this damage, so the array was recovered and the deployment abandoned.

The proximity of crane to the port rail forces the crane to a near vertical position to work close to the rail. This results in a long scope which, along with the propensity of the ship to roll, results in

excessive swinging of the suspended objects. There is no way to prevent swinging as there is no way to get opposing tag lines outboard. A starboard side deployment will allow a reduction of the scope from the crane, minimizing the swinging on rolls.

2.2 HOT Winch

The Markey winch which has been used by the HOT program was overhauled in the UH Marine Center shop prior to HOT-24. This overhaul was requested by the PIs as the winch had not been serviced since at least last fall. The scope and quality of this overhaul appears to have been inadequate in light of problems experienced on both HOT-24 and HOT-25.

On HOT-24, the coupling on one of the hydraulic hoses failed during the first lowering (weight test), disabling the winch. New hoses were installed prior to HOT-25. Several serious failures occurred during HOT-25. Fortunately, the winch operators (ALPHA HELIX crew) noticed these problems in time to prevent further damage and possible injury. The ALPHA HELIX engineer repaired all of the problems with the exception of the feed rollers on the level wind which were serviced by Rosen.

2.2.1 diamond gear/shuttle

During the first lowering (winch test with weight only), the winch operator noted that the sides of the grooves on the diamond gear were being cut as the level wind shuttled back and forth. After retrieving the weight, the shuttle was taken apart, and the shuttle gear was observed to be frozen. Upon disassembly, it was obvious that the surface of the piece was corroded (rusty) and that the lubricating grease had combined with the rust to make a very thick paste which caused the gear to freeze.

2.2.2 level wind sheave

During a subsequent cast at the HOT site, the center sheave in the level wind mechanism started to come apart. The winch operator fortunately noticed an unusual noise and discovered that the bolts holding the two halves of the sheave together were backing out, and the wire was falling down into the bolts. Again, the ship's engineer fixed the problem.

2.2.3 gear lever

During the deep cast to 4700 m, the gear lever popped out and the winch began free-spooling when the rosette package was only 200 m above the bottom. The winch operator responded rapidly by applying the mechanical brake averting damage to the CTD and possible hocking of the cable.

2.2.4 level wind feed rollers

At the same time that the diamond gear shuttle was being repaired, it was noted that the feed rollers on the level wind were also frozen. These were disassembled, cleaned and lubricated. The problem was similar to that described above for the shuttle gear.

2.3 Rosette ring

The aluminum rosette frame had been modified by the Engineering Support Facility prior to HOT-25 by welding aluminum struts holding an aluminum ring to the frame. This was designed for use as a grappling hold during deployment and recovery operations. Several welds failed during one recovery operation, with the result that jagged ends of the ring and bars were swinging around above the deck because the tag lines then slipped off. The rolling of the vessel at the time was not extreme. Inspection of the welds by the Chief Scientist indicated that they were of poor quality.