PLUME CRUISE 3/KM0612 UNOLS CRUISE REPORT

prepared and sent: May 23, 2006

UNOLS CRUISE report:
http://www.gso.uri.edu/unols/pcarform.htm

1) ship: Kilo Moana (KM)
2) cruise dates: apr 12 - may 11, 2006
3) chief scientist: gabi laske
4) master: rick meyer
5) marine technician: tim mcgovern/kuhio vellalos
6) cruise number: plume 3/km0612
7) type of work: deployment of passive seismic OBSs/multibeam mapping
7a) funding source: NSF
8) area of operation: NP12
9) person to complete form: gabi laske
10) institution: sio
11) email: glaske@ucsd.edu
12) position on cruise: chief scientist
13) extent of meet objectives: 95%

BRIEF DESCRIPTION OF SCIENTIFIC OBJECTIVES:

* The primary objective of this cruise was to deploy 39 OBSs the second part of the PLUME array on the Hawaiian Swell. The second array will record distant earthquakes for a year. Its large aperture of nearly 1000~km will allow us to conduct at through surface wave analysis to study the lithosphere/asthenosphere system of the swell. It will also allow us to perform deep--reaching body wave tomography and a comprehensive receiver function study that will address the question of a deep or shallow origin of the Hawaiian plume. We also anticipated to retry the rescue of three lost instruments of the first array.

* A secondary objective was to perform multibeam surveys on transits between stations that fill in crucial holes that still exist in publicly available bathymetry maps. An area of special interest was originally the Maui Fracture Zone but other targets developed during the cruise, such as the Musician Seamount area, the Northern Arch Volcanic Field, the Molokai Fracture Zone, the Clarion Fracture Zone, various seamounts and an apparently unnamed terminated fracture zone north of the Clarion. We had mapped the northern part of the Maui fracture zone on the first deployment cruise a year ago. We planned to come back this year to map the southern part.

* A third objective tied to the research vessel was to evaluate the feasibility to recover OBSs. Since we failed to rescue the three non-recovered OBSs, an OBS package was dropped and recovered near midnight in moderate sea state after our last deployment. Despite the successful recovery, both OBS teams are still reluctant to chose the KM for recovery cruises. A detailed evaluation is attached.

Due to technical problems, we deployed only 37 of the 39 proposed sites. At one site, we tracked an instrument successfully to the ocean floor and we conducted a roughly 3~km wide acoustic survey around it. About 3/4 through the survey, we abruptly lost contact. Since this site is crucial to our deployment and we fear that we may not be able to recover the instrument, we deployed a second instrument near the original drop site. We therefore lost one site in our array. One of the acoustic units of the SIO OBSs failed the deep--sea 'rosette' test. The fear was that we would not be able to retrieve this instrument next year, once deployed. For unknown reasons, the lithium batteries of one SIO datalogger discharged during shipment from SIO to Hawaii. We therefore could not deploy an SIO OBS and lost another site in our array.

Due to a medical emergency evacuation, and subsequent time constraints, we had to rearrange the stations in the southwestern part of our array. While this allowed us to deploy the remaining 6 sites on our cruise, some sites anticipated to provide baseline data for the deep ocean may now be located too close to the edge of the swell though they will still provide valuable data.

14) rating of the science party: very good

SUGGESTIONS OR COMMENTS FOR IMPROVING SCIENCE PARTY PARTICIPATION:

The science crew consisted of a number of individuals tied directly to the project (Laske, Collins), OBS personnels (Collins, Bender, Peal, Ryder, Handy, Rapa, Aaron) and personnel responsible for watch standing (Weeraratne, Landuyt, Hogg, Drews, Messina, Hindley) in 4h--shifts. Weeraratne was on last year's deployment cruise on the Melville. Landuyt was sent by the Yale co-PI Dave Bercovici. Hogg worked for two summers in Laske's group and gathered experience on a prior Scripps cruise. He is about to graduate and was invited by the chief scientist. Drews was hired by the U. Hawaii co-PI Cecily Wolfe. He was on this year's recovery cruise on the KOK. Messina married WHOI engineer Bender just before the cruise. Bender had asked for Messina to join the cruise so that she can gather sea going experience for future cruises in her deep submersible group at WHOI. Hindley was hired by the chief scientist as the only person who responded to an SIO-wide search for watchstanders. Students argued that the cruise would be too long. The chief scientist is not sure how a month--long cruise could be made more attractive to graduate students. Adequate computer resources could be an issue. Hindley works as a data analyst in a seismology group at IGPP. Weeraratne was responsible for editing and plotting the seafloor mapping data. Hogg and Messina helped with the editing. Landuyt and Weeraratne also helped the SIO OBS group on deck when help was needed.

In general, the group worked out well and was very enthusiastic and committed to contribute to the success of the cruise. The group also mingled well with the ship crew. We had several games on board and conducted tournaments with mixed groups. The watch standing operation ran smoothly and communication between science team and ship crew was excellent, on and off duty. Unfortunately, YYYY injured his/her foot and required a medical emergency evacuation after treatment with antibiotics was unsuccessful. This incident somewhat disturbed normal operations temporarily as details about the injury surfaced. There may have been a preexisting condition that hampered a speedy recovery. His/her and Bender's departure did not compromise the remaining operations of the cruise. XXXXX did not quite fit in. He/she had prior seagoing experience with the XXXXX group at IGPP but the chief scientist was told only after we left port to be somewhat cautious. Apparently, he/she is somewhat inexperienced and quite naive about it. XXXXX did a satisfactory job at watch standing but didn't quite bring the same interest and enthusiasm for the project. For his/her age of 9999, he/she acted quite immaturely, disrespecting rules and others, including ship crew member. His/her supervisor was informed about this problem and he/she will not come along on future cruises.

Some problems surfaced when the science account of the satellite phone was cut off. The satellite phone was then available upon purchase of calling cards. Apparently, some members overused it for private purposes. The public internet PC in the hydro lab was heavily used and internet was mostly used for private purposes. The chief scientist declines to be the judge on this issue as lengthy cruises require a good deal of personal sacrifices.

15) Rating of the ship operator pre-cruise activities: excellent

SUGGESTIONS OR COMMENTS FOR IMPROVING THE PRE_CRUISE PLANNING AND COORDINATION, LOGISTICS, OR SHORE SUPPORT:

There is not much to improve. Planning appears to be slightly more laid-back than at other places (e.g. SIO). However, the chief scientist was contacted properly and on time and communication was excellent using email. The shore support was also excellent.

There was some confusion about available computer resources. In January, the chief scientist was shown the computer lab that has public computer access but is mainly used for seafloor mapping. The number of screens and computers in this room is quite impressive, as the listed equipment on the web site is. Most of these computers, however, are dedicated to specific cruise-related tasks and are not available to the science crew. And early clarification about this would help tremendously. Perhaps the web site could be augments with comments on how many public computers there really are. Networking capabilities are great on board. There are LAN connections in nearly every room which allows the science team to hook up their computers to the ship's local network for printing and checking the ship's email accounts. The science crew receives three dedicated IP addresses that allows access to the internet via satellite. Two of these were given to the two PIs of this project (Laske and Collins). The third IP address was dedicated to a public PC in the hydro lab. This public internet PC was heavily used and occasionally was a point of contention. After enquiry, the team was told that we could not have an additional IP address to remove some of the competition but was also kept under the impression that the third IP address that was dedicated to the public PC could not be shared among computers.

It was not until later that the chief scientist installed a wireless router to allow for more private machines to connect to the internet. Of course, this could potentially slow down everybody's connection to the internet but it appeared to be the only reasonable option to keep the team happy. Perhaps, the ship's support team should suggest such an option during the cruise preparation.

There was some confusion about berthing assignments which could be clarified if the web site were more specific on berthing. The 02 level holds staterooms for the master, chief scientist and most of the crew. The 01 level holds staterooms for stewards, marine technicians and science crew. The staterooms available to the science crew are significantly smaller than the others but the web site does not specifically specify that the larger staterooms are all reserved for crew. A clear statement on the web site would remove some of the confusion and dissatisfaction when coming on board.

16) Rating of the ship operator supplied scientific equipment and marine technicians: no rating

SUGGESTIONS OR COMMENTS REGARDING THE OPERATOR SUPPLIED SCHIENTIFIC EQUIPMENT AND THE MARINE TECHNICIANS FOR THIS CRUISE:

The two marine technicians (McGovern and Vellalos) were excellent and connected well to the science team. McGovern appears to have a great range of expertise and was able to fix major equipment failure. After initial occasional dropouts, the multibeam system failed nearly catastrophically, but McGovern got it up and running within a few hours. Vellalos is also very professional and connected particularly well with the younger members of the science team. Both technicians helped where they could with computer related issues as well as on deck during our 24h/day operations.

Scientific and office equipment:

* computing facilities: this issue has already been addressed above. Perhaps another public Sun workstation would be helpful.

* printing: printing was excellent. There is a copy machine in the library, two B/W laser printers and one color laser printer. The latter functioned during our cruise but may need some maintenance. There was also a Deskjet plotter that was used to print maps. For unknown reasons, connectivity to Macintosh computers disappeared sometime during the cruise and could not be reestablished.

* multibeam and echosounding system: the seafloor mapping system is excellent. Further comments are found in the attachment. The Knudsen echosounder lost the logging of GPS location sometime during the cruise and this could not be fixed. We still have GPS time so the location can be established during post-processing.

* a repeated source of frustration was the moving vessel profiler (MVP) that was supposed to collect water temperature and velocity profiles a each of the deployment sites or at least once a day to calibrate the multibeam system. The MVP did not work at the beginning of our cruise and nobody appeared to be unhappy about this. Instead, we collected regular XBT profiles. These were originally requested by the chief scientist but the marine techs said the there was no funding available to do these ($150 per XBT) and that the more cumbersome MVP has to be used instead. We ultimately collected XBTs throughout most of our cruise before McGovern got the MVP up and running and we collected profiles using this equipment from then on.

17) Rating of the scheduling of the cruise: excellent

SUGGESTIONS OR COMMENTS REGARDING ANY ASPECTS OF THE SCHEDULING PROCESS OR SHIP ASSIGNMENT:

we asked for an April cruise and we got it. The OBS groups appear to have some reluctance to use this ship for their operations but the KM is adequate for OBS deployments. OBS recoveries are another matter. Ship crew, chief scientist and OBS personnel disagree on this issue which is discussed in the attachment. The chief scientist would choose this ship, the OBS personnel would not.

18) Rating of the safety and shipboard and science operations: excellent

SUGGESTIONS OR COMMENTS REGARDING ANY SAFETY ASPECTS OF THE CRUISE, SHIP, CREW OR SCIENCE PARTY:

The ship crew was excellent, very professional. Safety issues have been addressed adequately. The science party had an orientation and safety drill near the beginning of the cruise. The ship crew had several drills during the cruise. Lifelines were deployed everywhere. The chief scientist did not allow wearing flip-flops during operations. Life vests and hardhats were worn on deck during deployment. Most members of the science team followed the rules. A foot injury of a member of the science party is somewhat mysterious and it is not clear if improper footwear played a role. The member allegedly wore standard sneakers in the computer lab when another member from the science team allegedly stepped backward and hit the foot. The member who stepped on the foot does not recall the incident. Sneakers appear to be proper footwear in this case and the accident appears to be a freak accident that can happen despite following all reasonable safety directions (wearing steel-toed boots in a computer lab is probably overkill).

19) Rating of the officers and crew: excellent

SUGGESTIONS OR COMMENTS REGARDING ASPECTS OF SHIP'S CAPTAIN AND CREW SUPPORT:

The crew was excellent and I would sail with them again. The captain and many crew
members interacted well with the science party which made this cruise a real pleasure.
The bridge officers communicated well with the science crew in the computer lab as well as in lab I-1. Marine technicians McGovern and Vellalos were very capable and interacted well with the science team. During operations, continuous communication with the bridge was maintained through two-way radios. The food was excellent, and the whole ship team did an excellent job to keep the engines and everything else running for us.

20) Rating of the research vessel and its installed equipment: no rating

SUGGESTIONS OR COMMENTS REGARDING THE VESSEL AND ITS INSTALLED EQUIPMENT:

The KM is a very nice, spacious ship and the chief scientist would love to go out on this ship again. The deck is reasonably large, not as large as that on the Melville but functional nevertheless. The seafloor mapping facility is excellent and data are outstanding, not lastly due to the ship's unique twin-hull design. After a recovery demonstration, OBS personnel still maintains that this ship is probably not suitable for recovery. Details can be found in the attachment.

Just one item that could be improved is the folding crane that we used for deployment. This was the same crane that we used on the KOK for recoveries. It appears to react a little slow. Apparently, it cannot do several operations at the same time so that movements appear a little awkward. It did take some time to get the instruments from the deck into the water.

21) **NUMBER OF SCIENCE DAYS LOST DUE TO**:
- weather: none; the weather was very good; the swell was somewhat higher initially
(12-15ft) but then remained below 10ft during the second half of the cruise.
- ship, ship's propulsion, power, crew, etc: one of three running engines had a problem
but did not cost us significant time; the engine was repaired after we collected spare
parts from a small vessel that met us near one of our deployment sites; the time lost
(less than 2h) was easily made up by the fast cruising speed of the vessel;
- ship's scientific equipment: the multibeam failed during the mapping of a particularly
interesting area; the chief scientist therefore decided to stop the vessel for 1h to allow the marine tech more time to repair the system; this loss was made up by the high cruising speed of the vessel;
- user--provided equipment: the first SIO rosette test lasted more than 10h, much longer than the 6.5h originally alloted; a second test was necessary which lasted only 3h. Together, these operations caused a net loss of 6.5h. One instrument lost contact during deployment and attempts to reestablish communication pushed the 'time on site' of 11.75h beyond the alloted limit of 4.7h to a net loss of 7.05h. The failure of the SIO GPS clock at the deployment site of a SIO OBS caused a 2h delay, before the chief scientist ordered the deployment of a WHOI instrument instead. The SIO OBS team was then given more time on transit to try and fix the problem. During at least two WHOI deployments, the sensor ball started to fall off the frame. This delayed the deployment somewhat, but only by fractions of an hour. The loss of time was made up during the deployment of other instrument. The average time spent on site was around 4h and thereby lower than the alloted 4.7h.
- a medical emergency evacuation delayed the progress of the cruise by 30h. At the time of the evacuation, we had accumulated 20h contingency time. We therefore fell 6h behind schedule during a rather late stage of our cruise (only 6 sites remained to be deployed), just before a weekend. The only reasonable option was to

change our instrument layout to safe 6h of steam time. Sites #68 and #70 are now significantly further north, closer to the swell.

sent to:
- ship operator
- PI
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- Linda Goad