CRUISE REPORT
FM-27

STUDENT CRUISE VI

I. Brief Chronological Narrative

2 Jan 85 8:30 am - 1:30 pm transit Austin-Galveston in Institute van with five students. Some snow and ice on the first half of the trip, rain on the second half. The other 11 students arrived by about 7 pm. Watch schedules were initiated immediately and practice running DEMUXR (multichannel data acquisition) was begun.

3 Jan 85 Noon departure was delayed at least 24 hours because of strong northerly winds (gale warnings were issued) and predicted seas up to 16 feet. DEMUXR practice continued - frequent crashes were induced. Annotation and digitization of bathymetry from a previous cruise (FM 2502) and preplotting track lines were begun.

4 Jan 85 Departed dock at noon. Tide was very low, but departure went smoothly. Fire and abandon ship drills at 2 pm. All personnel attended promptly and attentively. Small following seas were pleasant. 10:48 pm began streamer deployment attaching birds, checking depth sensors, and removing about 90 lbs (34%) of the lead weights, because water temperature (17°C, 63°F) and thus buoyancy was much less than the last time the streamer was used (Aug 84, water temp. 83°F).

5 Jan 85 Completed first streamer party 2:03 am. Front end was running too deep, so I brought it in, removed a depressor, and shortened the tow point. Then it was too shallow, so I lengthened the tow point, and it rode satisfactorily. Maneuvered about 3 hours to beginning point of first line (SC-60). Deployed one gun about 6:30 am and began data acquisition about 7:45 am. Deployed magnetometer shortly thereafter. First line deviated slightly to avoid drilling rig buoys. 12:45 pm began second line (SC-61) adding a second gun, slowing the firing interval from 13 to 21 sec, increasing record length from 8 to 10 sec, and maintaining a 4 ms sampling rate. Second line had a few interruptions due to: (1) gun repairs, (2) compressor repair, and (3) laboratory accident. It was completed about 12:30 pm the following day. The laboratory accident was the inadvertent turning off of power to the selector box causing, in turn, the shutting off of the DFS. Geometry was not optimal because of periodic failures of communications with and within the bridge concerning ship's speed.

6 Jan 85 Second line completed about 12:30 pm; turned on to third line (SC-62) by 2:30 pm, but after one-half hour I decided that it was better now than later to retrieve one gun from which the winch line had become separated (two or three connecting shackles had disappeared). The geophysical field technician party (Oscar, Stirling, and George) proceeded to do this by lifting the gun by the tow chain in two successive steps. A hook was first atttached about halfway down the chain and the gun lifted that far up. Then the chain was rehooked just above the gun and it was winched aboard - all in a little under one hour (3:00-4:00 pm). We continued on line until a little after 9 pm when we

shut down and circled for three hours as a time sharing courtesy to the WESTERN SOUND.

7 Jan 85 Resumed shooting a little after midnight. 8:30 am received further requests from the WESTERN SOUND to stop firing. I counter-offered to reduce output energy by one-half (by taking one gun off line). We determined that we were diverging and that the reduced output would be acceptable in two hours; so I shut the guns off and circled from about 9:30 to 11:30 am. I reconfigured the DFS to 8 second records, 12 sec rep rate, 4.9 kt ship speed (12 fold) and 4 ms sampling rate shooting one gun. This system was continued for the rest of the cruise. Turned to fourth line about 8 pm. Some gun failures were corrected by switching guns in midafternoon. Completed this line shortly before midnight and turned on to fifth line (SC-64).

8 Jan 85 Began sixth line (SC-65) a little before 7 am and completed it about 7 pm. Shot seventh line (SC-66) until time ran out about 10 pm. Retrieved guns and magnetometer 10:10 - 10:30 pm; retrieved streamer 10:40-11:35 pm. Transitted to Galveston arriving at the dock at 11:40 am, 9 Jan 85.

II. Comments and Discussion

Multichannel System

Streamer The streamer (24 live sections, 0 dead sections, two stretch sections) appears to be in very good shape. Although the equation for buoyancy called for removal of 40 to 48% of the lead, and only 34% was removed, the streamer seemed a little light. With a depth setting of 42 ft the towing depth was from zero to 15 ft shallower. The tail end ran a little deeper, due most likely to a depressor (v-fin) placed just forward of the tail buoy. The near end ran only about 5 ft shallow due to pull-up at ship's speeds of 4 to 5 kts. The streamer now has about 173 lbs of lead with 5 to 7 lbs (mostly 6 or 7 lbs on each section). No repairs were necessary. The bird noise noted on FM 26 was not examined. The DFS data will be checked for this during processing.

DEMUXR-DFS This system, especially DEMUXR, worked extremely well. This was a pleasant surprise considering its behavior during precruise practice. During that time, 6 or 7 tapes were reused often with a high data volume set-up (8 sec records, 12 sec rep rate, 24 channels, and 2 ms sampling rate). Doing this, we made the program crash (similarly but not identically to the way it did three times on FM 26) upon tape drive changes from every drive (not just from one as on FM 26). Details of the 8 or more crashes will be submitted to Mark Wiederspahn. On the cruise, two changes from this mode of operation were made; and one or both led to a trouble-free (zero crashes) operation. The changes were (1) smaller volumes of data per shot were handled (4 ms sampling instead of 2 ms), and (2) all tape drive changes (except the very last one) were done during the idle phase rather than while processing data. This latter condition was accomplished by limiting the maximum number of shots per tape (an option of DEMUXR version 1.8) rather than having drive changes triggered by the end-of-tape mark. Furthermore, drive C (from which the three crashes on FM 26 occurred) was not used, because after the practice sessions it would not load a tape.

The reason for the accidental powering off of the system is speculative, perhaps someone's foot or pantleg caught on the power switch (located near the floor in a narrow passageway). I did not witness this event; but the fact that the system was down for about 10 minutes suggests that a more insistent audible alarm signal should be added to the subroutine for this event in the DEMUXR program. A notation ("DFS OFF") on the printed log was all that I was able to observe about the event.

Tape errors were remarkably few - fewer even than DFS internal errors which were infrequent but persistent (a couple per tape). A minor problem with the DFS is the record counter (octal) which skips one, then repeats one record number every 8 shots. Since record numbers aren't much used, this is no particular problem to processors; but the QC programs check for record number sequence and output an error message every 8 shots which makes for big log files from this program.

By far the largest source of downtime (excluding external sources like other ships) is in the sound source system - first the guns and second the ship's compressors, power, etc. Often the result of mechanical failures is loss of data quality (e.g., low air pressure, erratic firing) rather than loss of data. Evidence that this problem is related to infrequent use of the system is that these problems tend to go away as the cruise gets longer. Overall, the multichannel system was about as trouble free as I've ever seen it.

The improvement of the system as the cruise progressed is also an indicator of the skills and talents of the field party (Stirling, George, & Oscar). Unfortunately, for one operation - the retrieval of the gun that had lost its winch line - the very high degree of efficiency was at the expense of proper communication with the ship's crew and adherence to ship's safety policies. I feel that the primary, correctable error here was that as chief scientist, I took the role of passive observer assuming that a properly coordinated plan was made rather than reviewing the plan first and assuming the reponsibility for coordinating the operation with the ship's captain and crew. This experience has made me acutely more alert to this responsibility.

A new means of coordination was attempted on the streamer retrieval. That is, the captain (ship's operator for the upper back deck) and chief scientist (streamer winch operator) were in communication through voice activated, portable radios. The operation went smoothly so this seemed to work satisfactorily. It has the advantage of freeing our hands while communicating. At the lowest setting, the radios usually aren't activated by ambient noise right at the control stations as long as the compressors aren't on. The disadvantage is that the two operators are in communication only with each other unless a PA mike is also picked up. I disliked this, because I feel that the whole operation is best coordinated when everyone (others on the deck, the lab, the bridge, etc.) is aware of all the communication that is taking place, as is the case when the PA system is used. If the radios could be patched into the PA system, I would think it the best system.

Navigation and Data Logger

These operations went very smoothly and warrant only two comments. The data logger printer changed fonts spontaneously during the cruise. Commands to do this intentionally would be desirable because smaller print would conserve paper, and this system produces copious output. Having the magnetometer on while the instrument is on deck produces overflow in the data slots and caused a processing program to delete lines or something bad like that. Eddie Nicol altered the program so that now even such a neglectful act is tolerated by the computer.

Bathymetry (3.5 kHz Profiler)

The data collected by this system has the very good quality that is associated with perfectly calm weather which we had. One problem area exists - the horizontal scale, i.e., the paper feed mechanism on the flatbed recorder. A very long standing problem persists, namely that at various (random?) times the paper will advance on only one (the first, I think) of two consecutive print cycles. At other times it advances on both. Additionally, the recorder would spontaneously stop advancing or start advancing at an enormously accelerated rate. The situation was usually corrected by switching various things off and on until a normal paper advance rate returned.

III. Summary

The cruise was very successful in that about 350 n.mi. of very good (for us) multichannel data were collected and that 16 students got a good idea about what is involved in collecting marine geophysical data. A perception that was very frequently repeated was that this type of hands-on experience is almost unknown in the rest of their academic program, that it is extremely valuable to them, and that it is almost infinitely more enjoyable than classroom experiences. One might argue that the weather was too good.

Respectfully submitted,

E. W. Behrens

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