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September 19, 1995

Dr. Paul S. Stoffa
Director, Institute for Geophysics
The University of Texas at Austin

Dear Paul:

The 1995 student cruise to the Gulf of Mexico was a great success. Attached are summaries by Bill Behrens and each of the students involved (9 in all, 7 graduate and 2 undergraduate). All appear to have had a positive experience.

We were also able to conduct a thorough test of the DOD (DURIP)/ONR-supported "portable" MCS system developed by Diebold *et al.* at L-DEO. Although the streamer did not perform up to specs, we collected ~200 miles of data which will allow us to evaluate various aspects of system performance. That should make our lives A LOT easier when we take the system to northern California next year as part of the STRATAFORM initiative.

The *Gyre* was also a pleasant surprise. The TAMU staff were professional, the berthing was more than adequate (especially considering the size of the shipboard party), and the food was quite good. Excellent weather throughout made things easier, too.

Last but not least, I want to commend three others from UTIG who volunteered to go along: Nathan Bangs, Craig Fulthorpe and Jay Pulliam. All helped to educate the students, and their combined expertise helped the general decision-making atmosphere aboard ship. For once, too many cooks did NOT spoil the broth.

If there is any other documentation that you need from me in support of the expenditure of student cruise funds, do not hesitate to contact me. I thoroughly enjoyed the experience. Thank you for making the opportunity available.

Sincerely,

A handwritten signature in blue ink that reads "James".

James A. Austin, Jr.
Senior Research Scientist

JAA/ja
Enclosures

xc: E. W. Behrens
N. Bangs
C. Fulthorpe
J. Pulliam

Report on Student Training Cruise to East Breaks, Northern Gulf of Mexico to Test Portable Multichannel Acquisition System Aboard the R/V *Gyre*

September 11-17, 1995

by Dr. E. William Behrens

Field Area: East Breaks—indentation of the shelf break on the face of a low-stand delta. This is the apparent source for two down slope sediment transport lobes involving different depositional processes (debris flows and turbidity currents), the cause of the difference being unknown and the objective of a master's thesis. The study area centers at about 27°40'N, 95°40'W.

Student Activities: Maintaining deck, navigation, seismic data acquisition, and core acquisition logs; piston coring operations; core lab analyses; 3.5kHz reflection profiling equipment operation; navigation equipment operation (usually); navigation plotting and course maintenance; preliminary multichannel data processing.

Accomplished: Twenty-two survey lines were designed for the cruise; 20 of these were shot along with numerous (~20) others designed to 'home in' on areas of greatest interest. Eight(~) lines were shot with multichannel seismics. Ten cores were planned, 14 were taken. The numbers reflect the acquisitional super-success of the cruise.

Student activities went as planned with similar over-achievement. Students saw a significant variety of types of field work as well as two types of strategy, following a predesigned research plan and adaptation of the plan to advantageously take additional, critical data. As usual, by the end of the cruise we had a well coordinated crew ready to accomplish much more acquisition with minimal supervision, if we had had the time.

**Evaluation of Student Training Cruise to East Breaks, Northern Gulf of Mexico
Aboard the R/V *Gyre***

September 11-17, 1995

by Martha Beltran

The cruise have been a rich experience for me because:

I got acquainted with the operations involved in acquisition of marine information such as seismic information and cores.

The students duties allow me to get involved more directly with the multiple rolls that are played in an investigation cruise and was a rich experience working with a team.

As a "pseudomicropaleontologist"; help me to understand the value and limitations of the core information.

Been involve with a true operation of acquisition give me a valuable experience which would be impossible to get into the campus; or books; because here, we are facing true problems, and not expected situations in which our "leaders" have to take immediate (good or bad) decisions.

Having different operations going on, at the same time is a rich experience, even when you are just hanging around.

It was really nice to find that all the "leaders" were open to any kind of questions and always given more than we ask for.

Things that could be improved is :

A more detail tour the first day; in which we get acquainted with all the equipment specially the ones involved in the seismic.

To much free time? (I guess this is not a problem; we always found something to do)

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by Lee Calaway

Having never been at sea beyond sight of land, I began this trip with no expectations or prejudices. I was both pleasantly surprised and impressed with the nature of the hands-on, work-related duties available on this cruise.

I had taken Dr. Moore's Marine Mining and Marine Geology courses, along with Dr. Behrens' Marine Geology course prior to this cruise. However, no amount of reading is equivalent to actual experience. I found all personnel aboard the *Gyre* readily available and open to questions.

I was able to acquire some experience and knowledge of

- (1) operating the flatbed recorder
- (2) operating the GPS instrument
- (3) plotting progress on Marine chart
- (4) recording information of various kinds in different logs
- (5) taking core samples with the gravity corer
- (6) deploying and retracting seismology cable
- (7) deploying and retracting the air gun
- (8) operation of H-frames and associated winch and cable systems.

In addition to these particular skills, I was able to observe general ship procedures.

My overall impression of the cruise is very favorable. I have a much deeper understanding and appreciation for the planning and execution stages of a marine mining venture than before the cruise; so much so, in fact, that I feel an increased commitment to my own dissertation concerning the economics of marine mining

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September 11-17, 1995

by Jacqueline S. Floyd

My purpose for participating in the UTIG student cruise was to gain practical experience in collecting marine geological and geophysical data. I met this goal by participating in four primary areas of shipboard activity: seismic streamer deployment and recovery, and seismic acquisition quality control; operation of the global positioning system receiver for course navigation and course plotting; operation and record keeping of the 3.5 kHz precision depth recorder; and observation and record keeping of piston coring operations. For the post-cruise report I plan to process and interpret one or two seismic lines collected with the new portable multichannel seismic reflection acquisition system which was tested for the first time during this cruise.

Opportunities to earn real world experience in marine geophysical exploration are relatively rare for undergraduate students. I feel very fortunate to have been a part of the student training cruise. Moreover, training in marine multichannel seismic reflection data acquisition will directly benefit my current work at UTIG and my career goals as a geophysicist. I have never taken a course in geophysical data processing, but by the time that I complete the post-cruise project and report, I will have acquired, processed, analyzed and interpreted multichannel seismic reflection data--all without ever stepping into a classroom. ...And I learned how to tape chain.

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September 11-17, 1995

by John Gamble

The stated primary goal of the cruise was to test a "portable" 48 channel, "solid" streamer seismic system. My personal participation in this phase of the cruise was peripheral, consisting of minor record keeping. Observation of the process gave me some understanding of system deployment, operation and of some of the inherent difficulties involved.

Collection of data in the East Breaks, Gulf of Mexico continental slope boundary, the secondary goal of the cruise, occupied most of my time during the cruise. The student party, under supervision, trained on and operated GPS and used the data to maintain records and provide navigational information. During the student watches operation of the 3.5 kHz reflection profiling equipment and navigational record keeping were the primary duties. My participation in piston coring operations gave me experience with rigging and deploying the equipment and also with the handling of the cores post collection.

I have had a long term interest in the student cruise. After waiting over two years to get into this class I find that my expectations have been met in many respects. During the cruise I gained some familiarity with a wide range of equipment that I had only previously read about. My primary, personal intent was to gain some hands on experience with the collection of data and operation of the shipboard collection systems. For example, although I had been introduced to GPS equipment in previous classes I had no opportunity for actual hands on experience until using the equipment during this cruise. Although outside the stated parameters of this course, I would have liked to have seen a wider range of sampling devices deployed.

For my project I would like to participate in the core lab analyses. I have proposed to Dr. Behrens that I be allowed to do mud characterization/ x-ray diffraction analysis on some of the samples.

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September 11-17, 1995

by Greg Grubbs

This cruise has been an excellent opportunity to get "hands on" skills working with various marine geophysical techniques. Some specific things I learned were how to:

- > use a GPS for navigation and course plotting
- > operate and monitor a 3.5 kHz reflection profiler
- > take piston cores
- > deploy seismic reflection equipment and assist in record keeping

For my research project I am interested in working with the 3.5 reflection profiles to map out the different sediment reflection types through our study area .

**Evaluation of Student Training Cruise to East Breaks, Northern Gulf of Mexico
Aboard the R/V *Gyre***

September 11-17, 1995

by J. N. Piper

Beginning the 11th of September, 6 days were spent collecting 3.5 kHz, multi-channel seismic, and piston core data at the East Breaks area, North-West Gulf of Mexico. This cruise had several objectives associated with this data collection that included, but were not limited to, the testing of a new "portable" multi-channel seismic data collection system owned by The Lamont-Doherty Earth Observatory, the collection of acoustic and ground truth data to be used in the study of near surface sediment transport processes at this site, and to provide the opportunity for students at The University to participate in an actual research cruise.

My primary interest in this cruise has been to use this newly acquired data to help support my thesis research in the down slope sediment transport processes that appear to have occurred and that have helped shape the East Breaks slide complex.

By all accounts the cruise has been a successful and rewarding experience for all. The 3.5 kHz data is of excellent quality and will enhance the data already acquired for this site. If anything, it helps to support my thesis even more. The 14 piston cores acquired, at first look, appear to be of good quality and I'm chomping at the bit to get back to Austin and begin conducting their detailed analysis.

The crew of the R/V *Gyre* have been most accommodating and have acted very professionally. They all seemed willing to go that extra step to help us in the successful completion of our mission, even when this required them to work in the early hours of the morning.

Many thanks to UTIG and Dr. Jamie Austin for providing this opportunity. Your help is greatly appreciated.

Evaluation of Student Training Cruise to East Breaks, Northern Gulf of Mexico Aboard the R/V *Gyre*

September 11-17, 1995

by Jennifer Smith

The purpose of this training cruise was to provide an opportunity for students with a variety of interests to learn about and participate in the collection of geological and geophysical data at sea. In addition to this primary goal, this cruise was designed to test a new multichannel seismic system and to collect data in the East Breaks area of the Gulf for a Master's thesis. The data collected include multichannel seismic, 3.5 kHz depth profiles, and a series of cores.

The students were organized on a 4 hour on/ 8 hour off watch schedule. Watch responsibilities consisted of maintaining navigation logs (using an Ashtech GPS system) and monitoring and annotating the 3.5 kHz records. A separate log was kept during seismic data collection, recording such things as firing time and depth. In addition, all students were welcome to participate in any activities on deck: deployment and retrieval of the streamer, air gun, and corer.

My primary interest in participating in this training cruise and the class to follow is to develop a better understanding of both seismic data collection and interpretation. I feel that a better understanding of these type of data will help me in the future as a geologist in any profession.

I did learn about the acquisition of seismic data on this cruise including the operation and function of the different parts of the system. It was helpful to participate in the deployment of the streamer and air gun because I was able to see what a streamer is, what the birds are and how they are attached, where the gun is towed, how it sounds, etc. I think that the seismic part of this cruise was more conducive to learning because the only purpose was to test the equipment. The scientists testing this equipment were more open to questions because the actual data was not the focus; in other words, the time could be taken to talk to a student about what was happening on the computer screen or in the water without missing a crucial channel or turbidite. The primary purpose of collecting the cores and the 3.5 kHz profiles was for a Master's thesis and not for the education of the students on the cruise. I do think that students learned about these other types of data collection, but many times the schedule was at such a speed where learning was sacrificed for the sake of the data.

I would like to now learn about the interpretation of seismic data. I plan on looking at a single trace from one seismic line and comparing it to the 3.5 kHz profile for that line for my class project. My hope is to learn to see similar features in the seismic record that I can see in the 3.5 kHz record. I will choose the line based on both the quality of the 3.5 kHz record and the variety of structures and facies seen in the record. Time allowing, and provided that the scales are compatible, I may also choose to include a core from the line in this study.

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by Laura Stewart

The training cruise was definitely a worthwhile experience. The two main benefits of the course (for me) were:

1) The 'hands-on' approach- this is the most (only?) effective way to teach field methods. Collecting data in the field is the first, and often one of the important, steps in doing any type of study, and really can't be taught any other way than through direct experience.

My thesis data came from a piston core that I did not take myself. I would much rather do my own field work, and I plan to do so for my dissertation research. Data for the project will come from cores, as is usually the case in micropaleontology. Participating in coring on the cruise gave me a much better understanding of how a piston corer works and how to prepare the cores for the trip back to the lab. One of the post-cruise activities will be learning how to open and process the cores we took on the cruise.

2) The geophysical emphasis of the cruise is relevant to my own research interest, which is applied micropaleontology- i.e., integrating foraminiferal data with core and seismic data. One of my objectives for this semester is to learn the basics of acquiring, processing, and interpreting seismic data. I am currently taking a course in exploration geophysics that compliments the training cruise.

I was already somewhat familiar with the acquisition of seismic data on land, but knew very little about shooting seismic at sea. I learned about the new streamer we were testing, as well as other types of streamers commonly used. I participated in the deployment of the streamer and air gun, and helped keep a log of our seismic data.

An additional aspect of the training cruise that I initially had no familiarity with is the 3.5 kHz profiling equipment. I learned what 3.5 kHz profiling is, what type of information we can get from profiling, and how to operate the equipment. Using the navigation equipment and keeping navigation logs was new, as well.

Post-Cruise Project- I plan to do a micropaleontological analysis of one or more of the cores. The details of the project depend on whether the cores penetrated debris flow/turbidity flow deposits, or if they only contain Holocene hemipelagic muds. We should be able to determine this when we open and process the cores. The analysis may include matching foraminiferal biofacies with lithofacies or acoustic facies.

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by Alison Teagan

The purpose of the Fall 1995 student cruise was to test a new portable seismic data acquisition system. Coring and 3.5 kHz profiling were also goals of the cruise. The seismic aspect of the cruise was most interesting to me. We saw the portable system being set up in the wet lab. The streamer arrived soon after we did and we helped load it onto the ship.

As students, we stood two 4-hour watches everyday. During watch, we worked primarily in the upper lab, monitoring the echosounder and the GPS display. The 3.5 kHz echosounder was turned on as soon as we left Galveston and remained on throughout the cruise. It required constant attention to make sure the depth range was correct. Its signal frequency was different enough from the air gun that it could run at the same time as the MCS. The air gun signal occasionally appeared on the 3.5 profile with its distinctive hyperbolic shape. We recorded our course and position according to the GPS receiver every ten minutes and plotted our position on a chart of the area. The chart also showed the different facies in the region according to existing 3.5 data, so we were able to relate the 3.5 profile to the geology.

We also helped out wherever we were needed during our watch. The streamer was deployed and taken in several times during the cruise so that the ship could stop for cores. We participated in "streamer parties", which consisted of deploying the streamer and attaching the birds and weights. We viewed the data we were collecting as shot gathers on a lap-top connected to the acquisition system.

We collected fourteen cores during the trip. We helped load the plastic tubes into the metal coring tube, pushed it over the side and waited for it to hit bottom. When it triggered, we noted the time and position in the log and waited for the core to come to the surface. When it reached the surface, we washed the tube off and extracted the plastic core case. The core was capped at the ends and catalogued. We helped process the trigger cores. They were about two feet long. We took a sample from them and placed it in plastic bag, then capped and catalogued the core.

We had the opportunity to obtain hands-on experience with seismic acquisition and coring. I enjoyed learning about the portable seismic system and it appears to be functioning well. I also enjoyed the chance to talk to John Diebold and Peter Buhl about the portable system and seismic acquisition in general. The coring process was new to me and I learned how cores are taken at sea, from deploying the coring gear to preparing the cores for transport back to UTIG. Hands-on experience is invaluable in marine geophysics and I am glad I had the opportunity to participate in this cruise.

For my project, I plan to process seismic data from the cruise. I will take Tape 2 back to UTIG with me, and I'll make a copy and send the original back to Lamont. This tape should contain at least one complete seismic line. I plan to process the line through stack and possibly experiment with migration. The main focus of the processing will be a velocity analysis. We will also try filtering and gain control. Deconvolution may not be necessary, even in shallow water, since the generator injector air gun should take care of any ringing.