CRUISE REPORT

Ship Name: Cruise No: C22-19

Departure: Jan. 5, 1980 from Rodman Panama

Arrival: Jan 22, 1980 at Rodman Panama

Days at Sea: 17
(Count day of departure but not day of arrival in port)

Days Foreign Port: -
(number of days in arrival port before next leg)

Area of Operation: Galapagos Ridge

Program Description: Geological support of NOAA Submersible diving program with DSRV ALVIN.

Program supported by what contract: NOAA — FORNARI / MALAHOFF

Participants: (All L-DGO unless otherwise specified)

Name		Title
Dr. Alex Malahoff	NOAA	Chief Scientist
Dr. Robert Embley	NOAA	Co-Chief Scientist
Dr. Dan Fornari	SUNY at Albany	Co-Chief Scientist
Michael Rawson	L-DGO	Scientist
Hank Chezar	L-DGO	Scientist
Dale Chayes	L-DGO	Scientist
Bill Ryan	L-DGO	Scientist
David Roach	L-DGO	Scientist
Ralph Roessler		Technician
John Di Bernardo		"
John Farre		Graduate student
Kerry Hegarty		Graduate student
Malakai Banuve		Core bosun

CRUISE REPORT FOR C22-19

Leg 19 of Cruise 22 of R/V ROBERT D. CONRAD was chartered by the National Oceanic and Atmospheric Administration to provide logistic and scientific support of a deep diving program using the submersible DSRV ALVIN.

Field work took place on the Galapagos segment of the global mid-oceanic ridge system. Nine dives to an average depth of 2600 meters were accomplished as well as 6 deep-towed camera and acoustic surveys and 2 dredges.

The dives and deep towed surveys explored the axial rift valley, the bounding rift walls, adjacent ridge-crest linear mountains, the intersection of the rift valley with the 85.5° fracture zone, and a seamount-like feature at this intersection.

The principal data consists of tens of thousands of color transparency bottom photographs, more than 50 hours of bottom black and white video television, and about a hundred nautical miles of detailed transponder-navigated near-bottom acoustic reflection profiles.

Five bottom-moored navigation transponders were deployed in a total of 3 survey nets along various parts of the rift axis. The rift was found to contain recently extruded pillow and ponded lavas only lightly dusted with calcareous sediment and still exhibiting fresh glass surfaces. The axial zone of extrusive volcanic activity is confined to a belt less than 2 km in width.

This belt has been stretched by tensional forces causing the development of shallow (less than 1 meter) and deep (greater than 50 m) fissures. Some of the fissures have a lateral continuity in excess of 1 km, others are offset by an anastomosing pattern, and others are offset by orthogonal transform faults. On three occasions the fissures split small conical volcanoes of pahoehoe surface textures. The submersible and the camera sled transected through these disected volcanoes. Relic hydrothermal vents (with dead clam shells, etc.) and hydrothermal chimneys were encountered, photographed and extensively sampled.

The rift valley walls are exposed surfaces of inward facing listric faults modified by mechanical defacement along joint planes. Terraces on the walls and the base of the walls are characterized by narrow talus ramps of angular basaltic boulders. The ridge crest mountains have a length to width ratio in excess of 14:1. They are asymmetrical in profile with steep outcropping escarpments facing the rift axis and gentle sediment cover slopes facing outward towards the ridge flank. The tectonic deformation zone at the fracture zone intersection is exceedingly narrow. The visual observations indicate sheared near-vertical walls whose directional relative motion has not yet been discerned.

Large axial volcanic edifices of the type described from

the "famous" area were not apparent. Volcanic activity seems to be greatly controlled by gravity resulting in the ponding of fissures and the construction of gently dipping pillowed terranes. The horizontal dimensions of individual flows are estimated not to exceed a few hundred meters. The dominant bathymetric relief is of tectonic (faults) origin.

Serious problems were encountered with the L-DGO air gun reflection profiler. A detailed report has been sent to Drs. Hayes, van Sanford, Windisch, Bookbinder, and Talwani (attached). The deck operations with the diesel powered trawl winch went much smoother than anticipated and we were able to fly the acoustic and camera sled consistently within 5 meters of the volcanic bedforms. The L-DGO transponders need to be modified to increase their output power and the receiver needs improved filtering and discrimination circuitry.

No equipment was either lost or seriously damaged. We strongly recommended that a well trained and experienced party chief be provided for all charter legs. The two technicians provided by L-DGO lacked field experiences and/or motivation to carry out their responsibilities satisfactorily. A considerable amount of very expensive ship's time was spent to get the L-DGO reflection profiler operational. A satisfactory operational ~~of~~ status was never achieved.

William B. F. Ryan

Representative for L-DGO on
Leg C22-19

WBFR:jw

CRUISE TRACK OF R/V ROBERT D. CONRAD 22-19

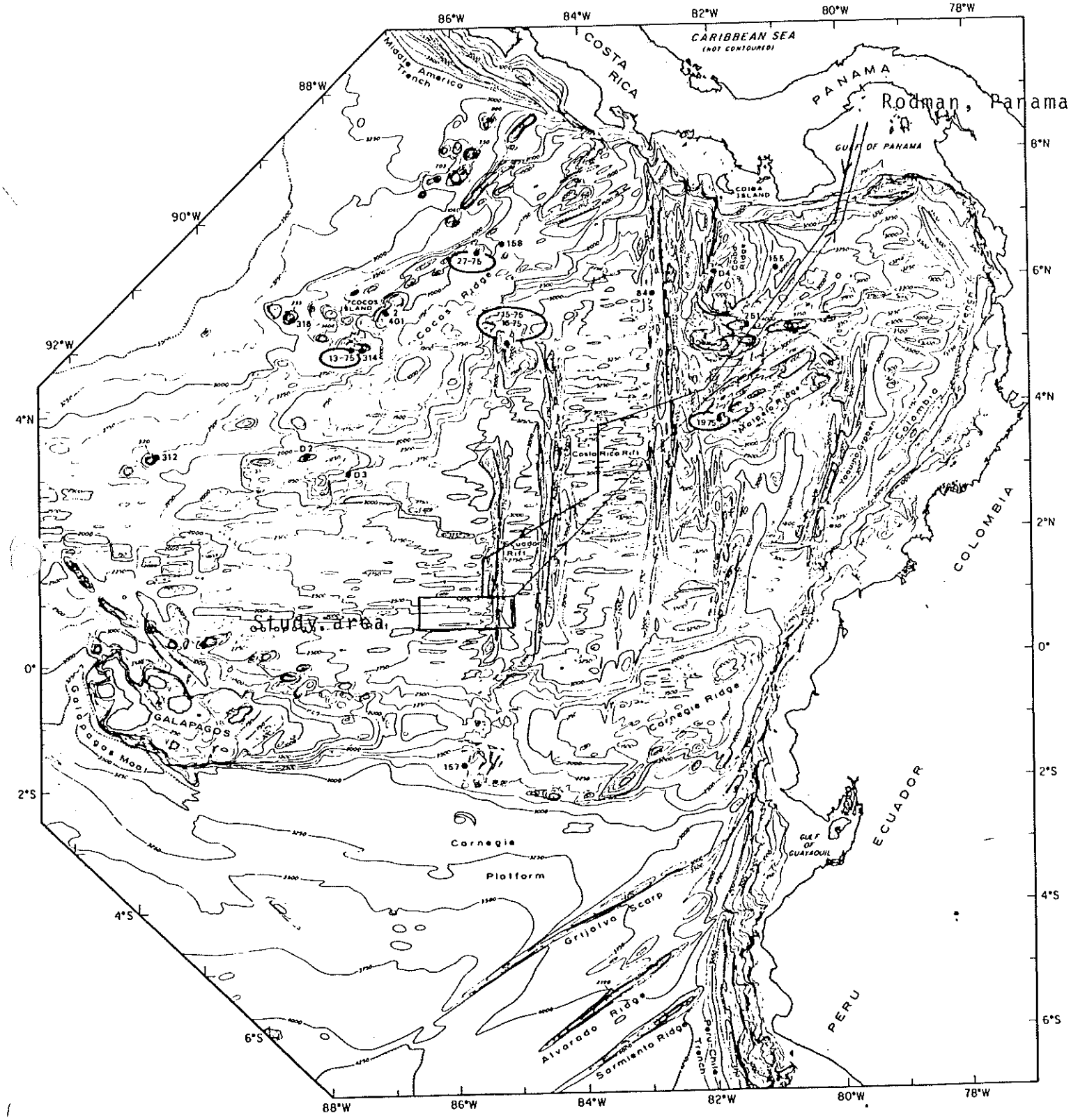

Fig.1. Bathymetric base map of the Panama Basin from Lonsdale and Klitgord (1978) with "Turtle" dive sites circled and other sample locations plotted. Contours in meters.

January 31, 1980

Memo to:

Denny Hayes
Harry Van Sanford
Charlie Windisch
Bob Bookbinder
Manik Talwani

I have just returned from the R/V CONRAD for a leg to the Galapagos area. CONRAD was chartered by NOAA to provide escort and auxiliary survey support for an ALVIN diving program. My group in the Old Core Lab was contracted by NOAA for transponder navigation of the submersible and deep-tow camera surveying and profiling. Through Denny Hayes Lamont also contracted for a single channel reflection profiling and ship's conventional navigation. I'm writing this memorandum because I wish to point out the very poor service given to NOAA for the reflection profiling aspect of the cruise.

NOAA had hoped to obtain a 80-hour long profiling transect from Balboa to the dive area at 0^{o}, -85^{o} plus some 20 hours of grid surveying over the Costa Rica Rift and 85^{o} W fracture zone intersection. The profiling operation was a bust, due to both equipment and personnel problems. Despite the fact that the equipment had been checked out by Harry, both the trip and the main eels failed when deployed. Specifically, the wiring harnesses ruptured at the pre amp battery pack assembly. To my amazement the batteries had no mechanical attachments or reinforcements. In fact, there were no spare batteries and there was no compensating oil onboard when we arrived.

The technician Ralph Roessler had never seen the system operation and had never trained at Lamont even for a day. He was completely out of his element and could not decipher the problem readily. The initial attempts to repair of the trip eel were successfully completed by Alex Malahoff, the NOAA Chief Scientist. However, no sooner than the trip eel was repaired, the main eel was discovered to have broken its connection. Some 3 hours of profiling was obtained and approximately 20 hours of down time was logged up. The down time cut directly into my allocation for transponder deployment.

The air gun was a newly re-bored nickel gun that had not been pre-fired by the technician John DiBernardo, despite the fact that he arrived in Panama a week before our departure. When fired underway, the gun would not hold a steady low pressure and it destroyed its Teflon piston seals at less than

2-hour intervals. This meant that one of our watch had to stand at the fan tail monitoring pressure manually and the gun had to be pulled on deck twice each watch. Later during the dive program, John showed little enthusiasm to participate in our surveys and one day he refused the Captain's and my directive to transfer to the LULU to assist in the dive launch and recovery. His explanation was that he did not work for either the Captain or myself.

When the dive program was completed and we set course for Panama, the eels again failed as soon as they were deployed due to the lack of any creative maintenance and repair by Mr. Roessler.

The 12 and 3.5 kHz sounders were bootstrapped together with a common precision oscillator, because it was explained to us that there were no spare boards. The oscillator was sick and it meant that our pinger traces jumped from one part of the record to another every few seconds. If we had not had our own technician we could not have used these recorders.

The EGR recorder had not been cleaned or maintained for a long time. The stems of integrated circuit chips were so corroded that they could not be removed without the legs falling off. The trigger circuit had been modified without correct documentation of the components both added and deleted. Fortunately we were able to effect repairs from our own supply of spares.

There was no operational pit log recorder.

The temperature in the dry lab the first day of sailing exceeded 100° with the ship's air conditioner on to the full capacity. We had to move our electronic installation to the computer lab. The computer lab could really use a repeater for the EM log, and an easy to read repeater for the gyrocompass.

Both Bob Embley (now with NOAA) and I were extremely embarrassed for Lamont. The Captain's performance and that of his crew and that of the mechanical deck equipment were superb but that of the electronics simply not fit for any sort of commercial lease. It not only did not work satisfactorily, it falls well below the state-of-the-art.

Problems were also experienced with Lamont's inter-ocean transponders. These are being discussed in detail with Bob Bookbinder.

The consensus onboard with George Gunther and myself is that the equipment in its present configuration is not amendable to navigation. Specifically the transponders do not have sufficient output power, the surface receiver lacks sufficient sensitivity, the filtering is in the wrong part of the spectrum and the discriminator circuits need to be individually adjustable.

There are two feasible courses of action:

1) Purchase a new system, especially designed for navigation, (would recommend AMF or Sona-tech).

2) Build a new and more powerful pinger circuit, install it with greater battery capacity in new extended pressure cases, keep the same release mechanism and electronics, build a new surface receiver, new filters, and new discriminators.

Our decision will consider both costs and timing and expertise limitations, considering that our next field program requiring transponders might be as soon as May 1.

I can't end on a pessimistic note. Alex Malahoff was certainly very pleased with the overall results of the cruise. We got a very exciting look at the rift valley with both ALVIN and our new Cheep-Tow Model 3. The pictures and video are truly spectacular. The accretion zone in the rift valley was shown to be extremely narrow, as predicted by Walter Pitman more than 10 years ago. We sampled some very interesting hydrothermal deposits and I have little hesitation that Alex will charter the CONRAD again if we can gut the dry lab and start over with some new instrumentation and support the instrumentation by trained experienced and motivated technicians.

Bill Ryan

WBFR:jw