CRUISE REPORT RC 24-05

Itinerary: Las Palmas, Grand Canary - Funchal, Madeira
April 27-May 15

Work Completed: 2900 km of 48-channel, MCS recording, under-way magnetics, gravity and 3.5 KHz echosounding, and 43 digitally recorded sonobuoys.

Funding Agencies: joint NSF/JOI, Inc.

PERSONNEL:

Gregory Mountain	Co-Chief Scientist	L-DGO
James Austin	"	UTIG
Mustafi El Asri	Observer	Morocco Ministry of Energy & Min.
Jenny Glasser	Watchstander	L-DGO
Carol Mountain	"	"
Paul Matthias	"	Texas A&M
David Divins	"	"
Jim Holik	"	"
Steve Hudson	Science Officer	L-DGO
Jim Smith	MCS Technician	"
Joe Stennett	"	"
Harry Van Santford	Electronic Technician	"
Kevin Little	"	"
Martin Iltzsche	Air Gun Technician	"
Daniel Bolles	"	City College, NY

Objectives: RC 24-05 was designed as the first of two back-to-back MCS studies of the Moroccan margin; see the cruise report for RC 24-06 for further details. The primary objectives of this first leg were:

1) trace oceanic crust on MCS profiles from anomaly M-22 landward to the Moroccan continental shelf, deploying numerous sonobuoys along these dip lines, and on the basis of reflection character and crustal velocity place limits on the location of the continent-ocean crustal boundary.

2) collect high-quality MCS profiles of sedimentary and crustal units for regional interpretation and for comparison with the time-equivalent units along the conjugate Nova Scotian margin.

Objectives to be dealt with more directly on RC 24-06 were:

1) acquire geophysical measurements along the margin to provide information on the along-strike variability of sedimentary and crustal provinces.

2) provide regional information on potential drill sites for the next phase of deep ocean drilling

Narrative: We cast off in Las Palmas at 3230 GKT on Wednesday, April 27. The next 2-1/2 days were spent refurbishing and ballasting the 2400 m, 48-channel MCS screamer at sea. Seven sections the the tow cable were replaced, eel oil was topped off, depth transducers were calibrated, appropriate weights were attached, a tail buoy with a strobe light and two radar reflectors were deployed, and the streamer was set to tow at 40 ft. We observed depth variations from 20 to 55 feet throughout the cruise, with total range among all six transducers at any moment usually about 25 ft. When retrieved at the end of the cruise, the transducer that had consistently read 10 ft. deeper than all the rest was found to be 10 ft. off calibration; apparently the streamer was level to within 15 or 20 ft. at all times.

Once ballasting was complelted the streamer was retrieved and we preceded to the start of the MCS survey. Enroute we began the underway magnetics, gravity, 3.5 KHz echosounding, and digital data logging that we continued to maintain for the duration of the leg.

Over the next fourteen days we acquired 48 channels of MCS data along the sixteen lines shown in the accompanying track chart. These data were recorded on the shipboard DFS—IV recorder, sampled at 4 msec over an 8 sec window with a recording delay of either 0, 2 or 4 sec, depending on the water depth.

Roughly nineteen hours were spent in turns between these MCS lines, during which time we occasionally shut down the compressors and/or the DFS-IV for routine maintenance. Otherwise, we were very fortunate to suffer only eleven hours of down time, as follows:

1) shark bites punctured one streamer section and required 3-1/2 hours of repair during which time the ship circled to resume MCS recording at the break-off point;

2) air gun repairs required a 6-1/2 hour circle;

3) a power failure halted recording for one hour, but the data gap was not serious enough to warrant our returning to fill it in.

During MCS profiling we operated as many guns as possible, maintaining air pressure at 1500-1800 psi and firing on a 20-sec schedule. We did not experience any abrupt changes in set or drift, and between satellite fixes we were able to maintain 4.7 to 5.3 knots over the bottom 80% of the time.

Forty—three successful sonobuoys were launched and recorded on both a shipboard recorder and digitized and taped on the shipboard data logger. Eight failures were encountered. All were recorded for at least 2-1/2 hours. The military buoy Type 57-A yielded the best results; signals from Types 41 and 41—B were not as strong. Two commercial buoys were recorded, but with inferior results due to excessive noise.

The major problem encountered was in regards to the short life of the firing cables to the air guns; roughly ten repairs of this type had to be made in 14 days. Breakage would occur either right at the connection to the solenoid, or right before the clamp that holds the cable to the tail piece. Different types of cables and different guns were involved; the common element appeared to be newly fabricated tail pieces. Perhaps there was too much flex in these new tail pieces. Whatever the cause, it forced us to using three guns 39% of the time, and to using two guns for 3% of the time of all MCS recording. However, so long as air pressure was kept near 1800 psi the shipboard single-trace monitors showed little difference in data quality between three and four guns.

MCS recording was terminated in the afternoon of May 14. The streamer was retrieved, and we steamed for Funchal continuing to collect underway magnetics, gravity, 3.5 KHz echosounding and digital data logging up to two hours from the time of docking, which was at 0610 GMT on May 15.

Scientific Results: On the basis of unprocessed, single-trace monitor profiles, a reflector corresponding to oceanic basement can be traced from the M-series anomalies landward to approximately the 3700 TO isobath, where salt diapirs rise abruptly from the base of the sedimentary section and reach sea floor. Landward of the diapiric front, basement is not traceable on single-trace records.

The diapiric province that characterizes the slope off Morocco apparently extends landward under the shelf as well. We observed what appears to be diapirs beneath a few tenths of a second of sediment cover in the vicinity of known commercial exploration wells.

Numerous refractions were recorded by most of the sonobuoys, and forthcoming analysis will help to determine if indeed all of the basement we observed is oceanic crust, or if it is of a "transitional" type whose boundary with true oceanic crust lies seaward of the diapiric front.

Numerous features interpreted as volcanic dikes intruding the sediment column were observed in profiles across the basement arch that extends NE from the Canary Islands and includes Conception Bank. These intrusions are often accompanied by local faulting of the overlying and adjacent sediments.

The seismic units in the basin west of the volcanic domain bear a strong resemblance to those of the North American Basin in the western North Atlantic.

Recommendations: The most serious problem we had - breaking firing cables - is probably the roost easily solved. In my estimation a return of the old design and material of former tail pieces is the solution. Furthermore, towing the guns so that they fire aft (not forwards as they do now) may reduce whipping and vibration that occurs now in the loop between the towing bridle and the tail piece clamp. Furthermore, Martin ought to be encouraged to experiment with quicker ways of wrapping the cables before deployment. At present, repairing a gun takes at least 45 minutes of cutting tape off the old gun and wrapping it on the new one; there must be alternatives to the countless rolls of brown tape and cans of Scotchkote now in use.

I'm not sure how serious a problem it is, but because of the different prop wash now that: CONRAD has a 5-bladed propeller the four air guns do not tow identically. If anyone insists on an even spread of sound sources across the wake a new towing arrangement will have to be used.

We had problems with the DFS-IV that were almost as frustrating as those with the firing cables. Parity errors showed up with more than normal frequency, and additional problems with tape run-ons suggested we were using ex- cessively dirty tapes. Although these were brand new tapes and of a type that has performed veil in the past, we suspect the DFS-IV tape drives were not the problem. More will be known after the next leg.

It was hoped that routine reduction of at least the satellite navigation could be done at sea. Unfortunately, the spare tape drive was not functioning, and the disk controller could not consistently load the operating system into memory. A ship at best is a hostile environment for a computer, but it would reduce problems if a tape drive, disk and CPU were moved to the below-decks computer lab and dedicate! strictly to underway use and data reduction, totally separate from the data logger in the main lab.

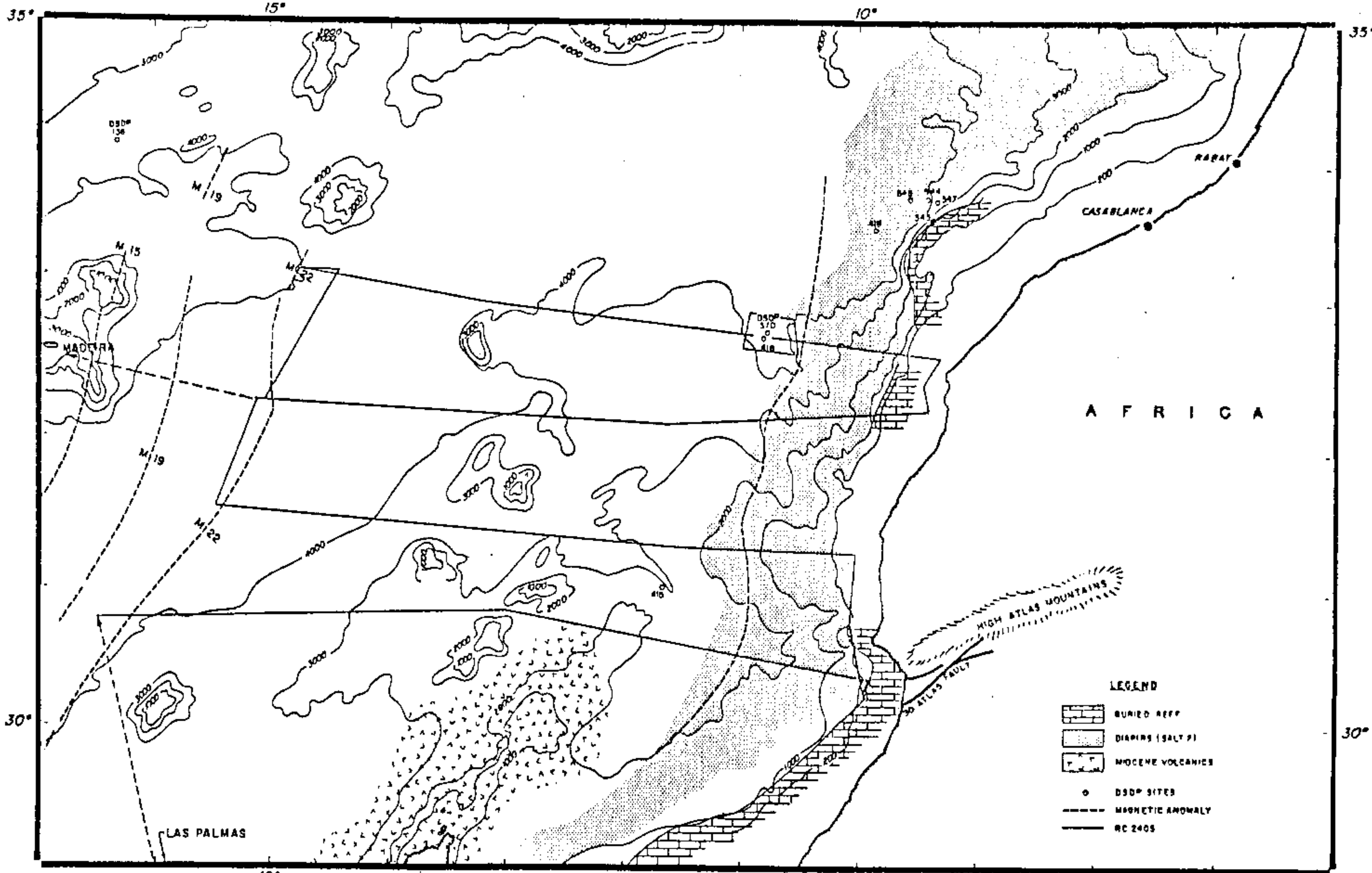
A reliable strobe light and radar reflector ought to be required for the tail buoy. Not only would this make it easy to monitor the position of the streamer, but it would improve the visibility of the streamer for other traffic passing by- our stern. During deployment on RC 24-05 the large, screen-type reflector was damaged (it is very fragile), and the strobe apparently died before nightfall of the first day.

I add my name to the list of others who see little sense in keeping the MCS lab separate from the main lab. Long before this cruise, plans were begun to change this during SEA-BEAM installation.

A below-decks storage tank of eel oil pumped to the fantail using ship's air would be of use during ballasting.

To end on a positive note, this was an extremely successful cruise, and much of the credit is due to Captain Jorgensen and his crew. All hands were professional in their conduct, very willing to lend extra help, and very easy to work with; I hope all of my future cruises will be as pleasant.

Gregory S. Mountain
May 24, 1983


AFRICA
RABAT
CASABLANCA
HIGH ATLAS MOUNTAINS
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MADEIRA
LAS PALMAS
DSDP 136
DSDP 370
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M 19
M 22
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BURIED REEF
DIAPIRS (SALT ?)
MIOCENE VOLCANICS
DSDP SITES
MAGNETIC ANOMALY
RC 2405
35°
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