CRUISE REPORT

SHIP UTIL ATION DATA

UNOLS Rev. 83

SHIP NAME R/V CONRAD	OPERATING INST. LAMONT	
CRUISE (LEG) NO. RC 2912	DATES 12/2/88 - 01/7/89	
AREA OF OPERATIONS: CENTERAL ATLANTIC (28°-31°N, 44°-41°W)	PORT CALLS: PLACE / DATES	
	Cadiz (Spain)	11/29 - 12/2
	Ponta Delgada (Azores, Portugal)	1/7 - 1/11
DAYS AT SEA / DAYS IN PORT		

PARTICIPATING PERSONNEL

CODE	NAME	TITLE	AFFILIATION
1.	J-C SEMPERE	CHIEF SCIENTIST	U Washington
2.	G.M. PURDY	CHIEF SCIENTIST	WHOI
3.	J. LIN	SCIENTIST	WHOI
4.	C. ZERVAS	SCIENTIST	U W

Use Reverse If Additional Space Required.

WAS RESEARCH CONDUCTED IN FOREIGN WATERS? NO COUNTRY: NO

PRIMARY PROJECTS (those which govern the principal operations, area and movements of the ship)

PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
JEAN-CHRISTOPHE SEMPERE and G. MICHAEL PURDY	NSF	?	(see above)
DISCIPLINE: MARINE GEOLOGY AND GEOPHYSICS			

ANCILLARY PROJECTS (which are accomplished on a not-to-interfere basis and contribute to the overall effectiveness of the cruise)

PROJECT TITLE AND PRINCIPAL INVESTIGATOR	SPONSORING ACTIVITY	GRANT OR CONTRACT NUMBER	PARTICIPATING PERSONNEL (AS CODED ABOVE)
/	/	/	/

Jean-Christophe Sempere

SIGNATURE _____ DATE 01/7/89

CHIEF SCIENTIST

TOTAL SCIENTISTS ____ TOTAL TECHNICIANS ____

TOTAL GRAD STUDENTS ____ TOTAL STUDENTS/OBSERVERS ____

ATTACH PAGE SIZE CRUISE TRACK

COST ALLOCATION DATA

DAYS CHARGED	AGENCY OR ACTIVITY CHARGED	GRANT OR CONTRACT NO.
40	NSF	OCE-86-16405

SIGNATURE _____ DATE _____

5.	B. TRAMS	SCIENTIST	VW
6.	J. DOLAN	TECHNICIAN	URI
7.	K. GOLDE	TECHNICIAN	URI
8.	A. YOUNG	TECHNICIAN	URI
9.	F. ROBINSON	SCIENCE OFFICER	LAMONT
10.	W. ROBINSON	PROGRAMMER	LAMONT
11.	T. NOLAN	TECHNICIAN	LAMONT
12.	M. ILTZCHE	TECHNICIAN	LAMONT
13.	R. MAIWIRIWIRI	TECHNICIAN	LAMONT
14.	H. VAN SANFORD	TECHNICIAN	LAMONT

June 6, 1989

TO:

Barbee, W.D. - UNOLS
Hannigan, L. - LDGO
Gerard, S. - LDGO
✓Hayes, D. - LDGO
Cox, L. - LDGO
Lotti, R. - LDGO
Raleigh, B. - LDGO
Simpson, D. - LDGO
Takahashi, T. - LDGO
Science Officer - CONRAD
Captain - CONRAD

RESEARCH CRUISE REPORT

R/V ROBERT D. CONRAD 29-12

Attached is a copy of a cruise report for the above CONRAD cruise.

Ann Burns
Marine Office

Enc.

A Sea Beam Investigation of the Mid-Atlantic Ridge Between the Kane and the Atlantis Fracture Zones

Chief Scientists

J.-C. Sempere
School of Oceanography
University of Washington
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and

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Woods Hole, MA 02543

1. Logistics

This cruise constitutes the second leg of a two-leg investigation of the Mid-Atlantic Ridge. The first leg (RC2909) took place in September-October 1988. Both legs replace a SeaMARC II survey of the Mid-Atlantic Ridge which had to be cancelled because of the poor performance of the instument during an earlier cruise (RC2908).

We departed Cadiz (Spain) at 6 pm on December 2nd and started steaming towards the Azores on our way to our main survey area near (30.5 N, 41.5 W). The 4 days transit between Cadiz and Ponta Delgada (Azores) was intended to be a training period for the 3 new Sea Beam technicians which were to operate Sea Beam and to process the data during the rest of the leg. This training period was led by J. Freitag and J. Miller, two senior Sea Beam technicians, who left the ship in Ponta Delgada in the early morning of December 6th. We then proceeded towards our survey area southwest of the Azores. We began our formal survey on December 10th.

The first 3 days of our survey were spent mapping a 50 km long segment of the Mid-Atlantic Ridge north of the Atlantis Transform. We then spent 5 days surveying the 70 km long Atlantis Transform. The next 17 days were spent mapping the portion of the Mid-Atlantic Ridge located between the Atlantis Transform (30 N) and 28 50'N. The first leg of this two-leg program surveyed the Mid-Atlantic Ridge between the Kane Transform (24 N) and 28 50'N. The two Sea Beam legs (RC2909 and RC 2912) give us therefore full coverage of the plate boundary along a length of about 900 km and a width of about 50 km.

Our survey consisted of 30 nautical mile long profiles centered on the spreading center and orthogonal to it. Our lines were spaced by 1.4 to 1.7 nm depending on water depth. We were fortunate enough to have good weather during most of the leg. Our progress was only slowed down once for a day due to high sea states and 20-40 knots winds.

During the last day of the survey we spent 6 hours sampling a small near-axis basin. The purpose of the smapling experiment was to investigate the origin of occasional drop-outs of Sea Beam beams over near-axis basins. We used a Woods Hole gravity core to recover a sediment sample from the floor of the basin. We then lowered a CTD and a Nisken bottle to obtain a temperature profile through the water column above the basin as well as a water sample. The gravity core and the CTD experiments were successful but, unfortunately, we were unsuccessful in retrieving a water sample. At the end of this station, we departed towards Ponta Delgada (Azores), our final port of call. The transit back to port started on January 3rd and we arrived in Ponta Delgada on January 7 at 8 a.m..

2. Personnel

G. Michael Purdy	Chief Scientist	WHOI
Jean-Christophe Sempere	Chief Scientist	UW
Christopher Zervas	Scientist	UW
Barney Trams	Scientist	UW
Jian Lin	Scientist	WHOI
James Dolan	Sea Beam Technician	URI

Kevin Golde	Sea Beam Technician	URI
Andrew Green	Sea Beam Technician	URI
Frank Robinson	Science Officer	L-DGO
William Robinson	Programmer	L-DGO
Ropate Maiwiriwiri	Technician	L-DGO
Harry van Sanford	Technician	L-DGO
Martin Iltzsche	Technician	L-DGO
Timothy Nolan	Technician	L-DGO

Additional personnel between Cadiz and Ponta Delgada (12/2/88-12/6/88):

Joyce Miller	Sea Beam Technician	URI
John Freitag	Sea Beam Technician	URI

3. Scientific Results

3.1. The Mid-Atlantic Ridge

The Mid-Atlantic Ridge between the Kane F.Z. and the Atlantis F.Z. runs uninterrupted by any transform offsets. The spreading center appears to consist of distinct en echelon units about 20-40 km long. The segments are right stepping. They are offset by non-transform discontinuities which do not exhibit oblique or transform parallel structures. Our restricted off-axis coverage suggests that some of these features have been migrating to the north. Within each segment, the neovolcanic zone appears to correspond with a 100-300 m high ridge on which are superposed small volcanic cones. These volcanic cones are not restricted to the (inferred) neovolcanic ridges. North of the Atlantis Transform, a large structure which we have temporarily interpreted as a volcanic field seems to have been active recently. Overall the general morphology of the Mid-Atlantic Ridge between 28 N and the Atlantis Transform is similar from what it is between the Kane and 28 N but small differences exist. It islikely that these differences may be related to a marked decrease of the average depth of the rift valley toward the Atlantis Transform.

3.2. The Atlantis Transform

The Atlantis F. Z. is a 70 km long transform offset along the Mid-Atlantic Ridge. Prior to this survey, this transform had never been studied in great detail. The eastern ridge-transform intersection (RTI) is well defined. The spreading center can be traced easily as it approaches the transform. The RTI is marked by a nodal basin about 4900 m deep. The transform domain is narrow and well-defined. The morphology of the transform is similar to other slow-slipping transforms in the Atlantic. The eastern RTI is poorly defined with no well developed nodal deep. The location of the spreading center, which is easily defined 20 nm south of the offset is ambiguous in the immediate vicinity of the transform. Contrary to the eastern side, the location of the aseismic part of the transform to the west is not obvious in the immediate vicinity of the RTI. Reconnaissance mapping of the fracture zone up to 30 nm away from this RTI reveals the presence of a well defined trough which corresponds to the fracture zone. This trough narrows down and shoals as the RTI is approached and finally disappears close to it. We believe that some of the complexities of the Atlantis Fracture Zone may be related to recent changes in the direction of relative plate motion.

4. Sea Beam operations

4.1. Personnel

Smooth Sea Beam operations were somewhat hindered by the inexperience of the three URI technicians but we did not suffer any significant loss of data. Minor problems resulted on a few occasions in longer downtime than necessary. The senior technician and data processor, Jim Dolan, had to spent long hours dealing with these minor problems in addition to the extra hours he was already spending in post-processing the data. We are extremely grateful to him for his dedication. If he had not been willing to work so hard we would not have accomplished as much as we did.

4.2. Equipment

Sea Beam worked faultlessly throughout the cruise but some of its related equipment broke down. The failure of one of the 3 disk drives prevented us from acquiring backscatter data as initially planned. This failure limited the disk space available to us which proved to be a handicap in postprocessing. The failure of the large Tektronix terminal prevented us from using some of the processing software. Essential spare parts for this terminal should be present on future legs.

4.3. Processing

The inexperience of the Sea Beam personnel with the processing software meant that we had to work doubly hard to obtain final Sea Beam maps. The failure of the Tektronix graphics terminal meant that we had to use a more conventional method ("bathymetry fixes") to obtain final contour plots than the interactive swath matching we started using on the Tektronix. The actual processing of the Sea Beam data started late in the leg due to the occurrence of minor problems that had to be solved by the Sea Beam data processor. It is only due to the dedication of Jim Dolan that we were able to get as far as we did with the postprocessing.

5. Ship operations and technical support

We are very grateful to Captain O'Loughlin and the crew of the R/V Conrad for doing their very best to make this leg a success in spite of engine and generator problems as well as occasional days of bad weather. The diligence with which the bridge followed our strict navigational requirements maximized our available ship time and allowed us to meet fully our scientific objectives.

Technical support on the Conrad was of very high quality. We are especially grateful to Bill Robinson, the Lamont programmer, who worked very hard and did a superb job at reducing the navigation as well as the magnetics and gravity data. He was extremely cooperative and thanks to his programming skills we were able to generate all the plots that we needed. We are also very grateful to Frank Robinson and Harry van Sanford for their cooperation in our short sampling experiment and for their help throughout the cruise.