CRUISE REPORT
SHIP UTILIZATION DATA

UNOLS
Rev. 4/83

SHIP NAME R/V CONRAD	OPERATING INST. L-DGO	PARTICIPATING PERSONNEL
CRUISE (LEG) NO. 29-08	DATES Aug. - Sept.	
AREA OF OPERATIONS: Kane F.Z. - Central North Atlantic Ocean	PORT CALLS: PLACE / DATES: San Juan, P.R. 9 Aug.; San Juan, P.R. 11 Aug.; St. Vincent, Cape Verde 12 Sept.	
DAYS AT SEA ~~35~~	DAYS IN PORT 12	

CODE	NAME	TITLE	AFFILIA
1.	Dr. Brian E. Tucholke	Sr. Scientist	WHOI
2.	Dr. Hans Schouten	Assoc. Scientist	WHOI
3.	Dr. Henry Dick	Assoc. Scientist	WHOI
4.	Dr. W. Kenneth Stewart	Assist. Scientist	WHOI

(over)
Use Reverse If Additional Space Required.

WAS RESEARCH CONDUCTED IN FOREIGN WATERS? No COUNTRY: --

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)
"Fine-Scale Crustal Structure of the Kane F.Z. in 0-80 m.y.-Old Crust" Brian E. Tucholke and Hans Schouten	NSF	OCE-8716713	1-7, 13-14 8-12
"Fine-Scale Crustal Structure of the Kane F.Z. in 0-80 m.y.-Old Crust. DISCIPLINE MG & G Alexander N. Shor	NSF		

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)
None			

SIGNATURE Brian E. Tucholke DATE 28 Sept 1988
CHIEF SCIENTIST

TOTAL SCIENTISTS 5 TOTAL TECHNICIANS 5
TOTAL GRAD STUDENTS 3 TOTAL STUDENTS/OBSERVERS 1
ATTACH PAGE SIZE CRUISE TRACK

COST ALLOCATION DATA

DAYS CHARGED	AGENCY OR ACTIVITY CHARGED	GRANT OR CONTR
~~48~~ 47	NSF	OCE 86-16405

SIGNATURE Richard Lawson DATE Oct 6, 1988
Institution Official

5.	Ms. Cecily Wolfe	Graduate Student	WHOI-MIT
6.	Ms. Gail Christeson	Graduate Student	WHOI-MIT
7.	Mr. Barnes Trams	Student	U. Wash.
8.	Dr. Tom Reed	SeaMARC Party Chief	HIG
9.	Mr. Wade Bartlett	SeaMARC Tech	HIG
10.	Mr. Joel Erickson	SeaMARC Engineer	HIG
11.	Mr. Daniel Johnson	Graduate Student	HIG
12.	Ms. Gail Yamada	SeaMARC Tech.	HIG
13.	Mr. David MacDonald	Science Officer	TAMU/LDGO
14.	Mr. Richard Bartholemew	Programmer	LDGO

R/V CONRAD CRUISE 29-08
CRUISE REPORT

A 42-hour test cruise (San Juan-San Juan) for the SM II system was conducted from 0930 on 9 August to about 0300 on 11 August. After disembarkation of SM II personnel who were aboard for the test cruise, CONRAD left San Juan about 0400 on 11 August to begin the Kane Fracture Zone science program. On 12 August the SM II system was deployed over the Nares Abyssal Plain for system checkout and to obtain flat-bottom tables. Upon recovery, the depressor weight was two-blocked against the LRS slider and broke off. The pressure release on the depressor weight functioned properly, and the umbilical, SM II fish, and drogue were recovered. Lost were the depressor weight, pressure release, slider cone, evergrip termination, and steel connector that passes through the slider cone. While repairs were being made, we proceeded to the start of the planned survey (west limb of Kane F.Z. near 55°W) and obtained a dredge (basalt) from a structural "dam" that crosses the fracture zone at 55°20'W.

Subsequent SM II surveying was conducted eastward along the fracture zone in a squared "Z" pattern, at an angle of about 35°-40° to the axis of the fracture zone. We ran f.z.-parallel lines (150-200 km long) back through the "Z" survey near 50°W and 47°W on the western limb of the fracture zone, and near 44°W on complementary crust on the eastern limb. Total time losses of about 8 days caused by various SM II repairs allowed us only enough time to do a single f.z.-parallel line from 43° to 42°W, and three f.z.-parallel lines from 42° to 40°30'W (the area complementary to the crust crossed by f.z.-parallel lines near 50°W). At that point we had to recover the SM II system and steam for Cape Verde, arriving about 0800 on 12 September.

During times when the SM II fish was aboard ship for repairs, we filled in the "dead time" with a total of 10 dredges along the Kane Fracture Zone (basalt dam on west limb; south wall of west limb; western ridge-transform intersection (2 dredges); transverse ridge on north wall of east limb (6 dredges). The rocks currently are in labelled burlap bags and boxed in two wooden crates on CONRAD. Shipping arrangements will be made for transport to WHOI from the Azores or Barcelona.

Details of performance of instrumentation and staff during the cruise are given on the accompanying "Research Vessel Cruise Assessment" form.

Shipboard logs (Main Lab; 5-Min. Log of bathymetry/magnetics), magnetometer records, and digital tape of navigation/bathymetry/ magnetics are to be shipped from CONRAD to LDGO. Navigation was essentially finalized on board. Bathymetry also was digitized on board and is in final form except for minor editing. Digital magnetics need only removal of regional field and editorial check. The 3.5-kHz profiles were shipped to WHOI for analysis in conjunction with the SM II side-scan sonar records; the profiles will be sent to LDGO for archiving following this analysis. SeaMARC II paper records and copies of digital tapes were shipped to WHOI. A total of 10 boxes of records, tapes, and computer equipment were to be offloaded from CONRAD in Cape Verde and air-freighted to WHOI by the agent (Agencia Nacional de Viagens). At this writing we are awaiting word from the agent about this shipment. The SM II equipment and tapes are currently stored on CONRAD and will be shipped to Hawaii Institute of Geophysics from Barcelona.

28 Sept. 1988
Brian E. Tucholke

SM II Transducers/Electronics

New transducers were installed in the SeaMARC II (SM II) fish in San Juan at the beginning of August. Installation and dockside testing were performed by SM II personnel and an engineer from the Danish firm that manufactured the transducers. A 42-hour engineering test cruise, which included the SM II personnel, the Danish engineer, and the scientific/technical staff, was begun at 0930 on 9 August immediately following completion and testing of ship repairs (generator, piping) on CONRAD. The engineering test isolated numerous difficulties in SM II performance, but by the end of the tests the SM II personnel felt that the SM II system with the new transducers was providing equivalent, if not superior, performance compared to the old system.

Once we began surveying on the Kane Fracture Zone, however, it became apparent that the SM II system was not performing up to standard. Among the more obvious problems identified (in the final analysis) were the following:

1) The port sidescan was noisy.
2) The starboard sidescan had a problem apparently related to "signal threshold", wherein returns below the threshold were not recorded and returns above the threshold often provided a saturated signal.
3) The starboard sidescan had very uneven signal response across track, possibly because of abnormal beam pattern. No PROM burner was available to correct for this effect.
4) There was often severe crosstalk between port and starboard (mostly from port to starboard) within the inner 4-5 km of swath, again apparently because of abnormal beam patterns.
5) The automatic bottom-detect system functioned very poorly (it was virtually inoperative the last 4 days of the survey), necessitating constant adjustment of the "fraud" in an attempt to manually track bottom.
6) Phase data along the inner ~1km and outer ~2 km of both the port and starboard swaths were extremely noisy, rendering derived bathymetry in these ranges essentially useless. Bathymetry in the 1-3 km range on both sides appears to be more coherent, but its validity is not yet certain.
7) Hang-up of the fish-attitude recording package on a 0.00° heading during turns.

In the first part of the cruise, SM II personnel felt that these problems could be solved by electronics repairs or modifications and by acquisition of good flat-bottom tables to generate bathymetry. After 2 1/2 weeks of attempted solutions, however, it became apparent that there were inherent problems in the transducers and/or eletronics that could not be corrected at sea. Thus all of our SM II data suffer from the above deficiencies.

Other, more intermittent problems included:

1) FSK telemetry hits,
2) Ground faults (see "Mechanical", below),
3) Intermittently very noisy records on both port and starboard sidescan (pronounced during the last 4 days of survey).

The FSK problems usually, although not consistently, were corrected by electronics repairs. The ground faults were correctable. No solution was found to the problem of record noise.

SM II Mechanical

The system was besieged by mechanical difficulties, including:

1) Breakage of conducting wires (causing ground faults) near the depressor weight (cable termination or umbilical termination).
2) Abrasion and breakage of the outer wire wrap on the coaxial cable at the slider cone.
3) Inadequate slider stops at aft end of Launch and Recovery System (LRS) and inadequate fastening of slider dogs (both broke during recovery operations).
4) Evergrip failure (0.4 m slippage of coax through Evergrip).
5) Breakage of weld holding aluminum lift ring at front of SM II fish under normal use in recovery operations.
6) LRS hydraulic system leak.
7) Breakage of Kevlar-reinforced umbilical during retrieval operations following fish loss.

The first four of these problems probably can be attributed directly to the fact that the LRS design is not compatible with operation off the high fantail of R/V CONRAD. With seas of only a few feet the tow point (slider cone) regularly jumped between 6 and ~18 feet above the water, severely stressing the tow system down through the coax cable to the depressor weight and forward end of the umbilical. The slider stops and slides also were not rugged enough to take the beating this kind of acceleration could generate during launch/recovery. In addition, with this fantail motion, the LRS platform could not be extended far enough to keep the aft end of the bed in the water (or at a semi-consistent depth in the water) during launch and recovery operations. This necessitated a rather tricky operation of timing critical launch/recovery procedures to the timing of the swell.

SM II Technical Staff

The SM II staff were competent and hard-working. Problems which arose in this category to affect the success of the science program were mostly the result of inadequate planning (i.e. understaffing):

1) The sole SM II Engineer was totally overloaded trying to make repairs during the cruise. A second engineer should have been aboard both to relieve the work load and to provide experience/interaction that may have solved some of the electronics problems.
2) The same situation applied to SM II personnel dealing with software. At least part of this problem could have been alleviated by better software documentation aboard ship.
3) The overload on SM II personnel resulted in minimal, "hit-or-miss" training of watchstanders/science staff, who were totally inexperienced with operation of the SM II system. This caused initial problems (several days) in quality of data acquisition until the watchstanders were able to obtain enough information and

experience to understand and deal with the peculiarities of SM II data acquisition.

Operator error during SM II recovery operations twice caused loss of the SM II fish and significant loss of survey time. In one instance the slider dogs were not released during depressor recovery, the depressor was two-blocked and broke off, and the slider cone was lost. A new cone had to be manufactured on the ship, and an old Evergrip termination had to be refurbished as a spare (an extremely difficult and time-consuming task). In the second instance, the slider was allowed to rise and drop against its stops, shearing off the stops and running the slider onto the umbilical at the front of the SM II fish. Attempted recovery of fish and slider together caused the fish to break off (the slider was recovered). A series of repairs and fish-retrieval attempts delayed the survey by 1.7 days. The errors can be attributed to a combination of operator inexperience, the inadequacies of the LRS as noted above, the difficulty of handling the LRS on CONRAD, and possibly operator fatigue.

SM II Operation Summary

Survey time loss attributable to SM II failures noted above (recovery, repair, launch, maneuvering back onto survey lines) amounted to 7.7 days. Another ~0.5 days of bad data or data loss were caused by FSK hits, computer crashes, etc. Considering transit days (6) to and from the planned survey, 26 survey days were available during the leg, so we acquired data along only 68% of the expected survey track.

Data quality were generally low to moderate due to the problems noted earlier, and at this time it is unclear whether, or to what degree, post-cruise processing may improve the sidescan images or bathymetry. In terms of its quality and utility, the data recovery is about half of what was expected.

R/V CONRAD Coring Winch

The level-wind system on this winch continues to create problems when attempting to lay on even wire wraps during dredge recovery. The standard operating solution that has developed, namely one or two people jockeying the level wind with blocks and tackles, is time consuming and not always successful. Some overheating in the hydraulics system during the first dredge station also caused delays; the problem did not recur in subsequent dredge stations. Total time loss caused by the above winch problems was about 8-9 hours over the course of 10 dredge stations.

R/V CONRAD 3.5-kHz Profiler

S/N on the 3.5-kHz profiler was very poor in water depths greater than about 4000 m. The 3.5-kHz system needs a thorough checkout and overhaul. Electronics spares for this system need to be checked out and fully stocked.

L-DGO Technicians

The two L-DGO technicians were very capable, hard-working, and helpful. The on-board navigation processing, real-time navigation plotting, and transfer of navigation

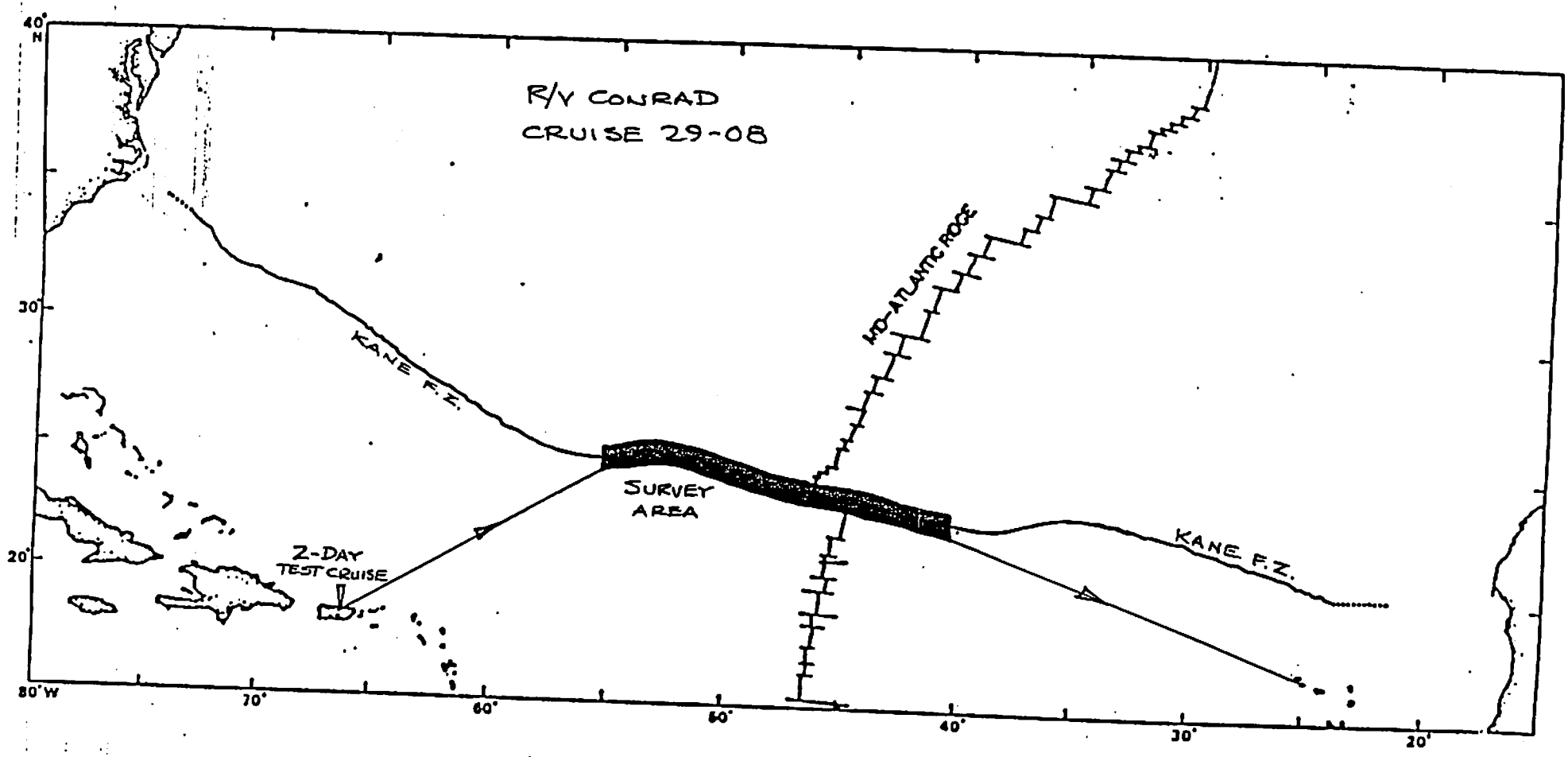
data over Ethernet worked very well. This should be standard operating procedure on future cruises.

Ship

We experienced no mechanical or electrical difficulties on this cruise, except for one instance where the Engineering Department (unbeknownst to the scientific party) was checking for electrical grounds and caused a momentary power outage. This crashed the computer systems and caused about an hour of SM II digital data loss before the system could be rebooted.

Ship Crew

The ship crew were both proficient and helpful under a variety of rather taxing conditions. Their skillful assistance during dredge launch and recovery, and their general professionalism during other operations, are to be commended.


R/V CONRAD
CRUISE 29-08
40° N
30°
20°
80° W
70°
60°
50°
40°
30°
20°
KANE F.Z.
MID-ATLANTIC RIDGE
SURVEY AREA
KANE F.Z.
2-DAY TEST CRUISE