CRUISE REPORT

SHIP UTILIZATION DATA

UNOLS Rev. 3

SHIP NAME R/V CONRAD	OPERATING INST. LDGO	
CRUISE (LEG) NO. RC 2710	DATES 14-30 November 1986	
AREA OF OPERATIONS: S. Atlantic Agulhas Ridge	PORT CALLS: PLACE / DATES: Capetown 13 Nov 1986; Capetown 30 Nov - 3 Dec 1986	
DAYS AT SEA ~~17~~ 16 / DAYS IN PORT 5		

PARTICIPATING PERSONNEL

CODE	NAME	TITLE	AFFILIATION
S1.	C. Raymond	Chief Scientist	L-DGO
S2.	Robert Leyden	Scientist	L-DGO
T3.	Joe Stennett	Science Officer	L-DGO
04.	M. Rawson	Observer	L-DGO

(OVER)

Use Reverse If Additional Space Required.

WAS RESEARCH CONDUCTED IN FOREIGN WATERS? Yes 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)
"An investigation of the Malvinas Plate Boundaries" John LaBrecque, P.I. Carol A. Raymond, Chief Scientist	NSF under JOI		
DISCIPLINE			

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)

SIGNATURE Carol A. Raymond DATE 30 Nov. 86
CHIEF SCIENTIST

TOTAL SCIENTISTS 5 TOTAL TECHNICIANS 8
TOTAL GRAD STUDENTS 0 TOTAL STUDENTS/OBSERVERS 1

ATTACH PAGE SIZE CRUISE TRACK

COST ALLOCATION DATA

DAYS CHARGED	AGENCY OR ACTIVITY CHARGED	GRANT OR CONTRACT NO.
18 (ENHANCE ON GRANT)	NSF	OCE83-16163 5-24982

SIGNATURE John R Reilly DATE 4 Feb 87
Institution Official

S 5. Lewis Gilbert	Watchstander/Grad Student	L-DGO
S 6. Carolyn Keyes	Watchstander	L-DGO
T 7. M. Iltzsche	Air Gunner	L-DGO
T 8. R. Currier	Electronic Tech.	L-DGO
T 9. R. Qali	Winch Tech.	L-DGO
T10. P. Bennett	Technician	L-DGO
T11. D. Caplan	Programmer	L-DGO
T12. R. Edwards	Seabeam Tech.	URI
T13. Joyce Miller	Seabeam Tech.	URI

File

Feb. 25, 1986

TO:

Barbee, W.D. - UNOLS
Dudley, J. - LDGO
Gerard, S. - LDGO
✓Hayes, D. - LDGO
Cox, L. - LDGO
Lotti, R. - LDGO
Raleigh, B. - LDGO
Ruddiman, W. - LDGO
Ryan, W.F.B. - LDGO
Sykes, L.R. - LDGO
Takahashi, T. - LDGO
Science Officer - CONRAD
Captain - CONRAD

RESEARCH CRUISE REPORT

R/V ROBERT D. CONRAD 27-10

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

Ann Burns

Ann Burns
Marine Office

Enc.

CRUISE REPORT
R/V Conrad 2710

Ports: Capetown-Capetown
Start: 14 Nov 1986 0600Z
End: 30 Nov 1986 0800Z
Total mileage: 3350 nm

Purpose: The objectives of this cruise were to carry out site surveys of two drill sites, SA-7 and SA-8, for Leg 114 of the Ocean Drilling Program. These sites are conjugate to sites in the western South Atlantic surveyed during August and September on the Polar Duke. Site SA-8 was located on the Meteor Rise, the other (SA-7) at Anomaly 21 on the eastern flank of the South Atlantic spreading center.

Data collection: Seabeam, single channel seismics employing two 80 cu.in. waterguns, magnetics and gravity were continuously collected. Bathymetric data were collected using the 3.5kHz system for the first two days, then it was turned off due to persistent interference with Seabeam.

Data quality: Data quality was very good in general; seismic records were high quality with good basement resolution in all water depths.

Problems: Many problems were encountered, as summarized below. Prompt resolution of these problems by the shipboard staff minimized data loss.

Seismics: During a turn in a heavy following sea (1600Z, 20 November) the two guns became entangled. Recovery of the guns was hampered by the sea state and their entwinement. The guns were finally brought aboard by 1900Z on 20 November. Minor repairs were performed on one gun, and it was redeployed at 2100Z. The other required slight rebuilding, and it was out of the water until 0945Z on 21 November. In another incident, the tow cable on one gun parted during the night, resulting in the gun being towed by the safety cable and damage to the solenoid in the firing circuit. The gun was brought aboard (0400Z, 28 November) and repaired but was not redeployed, since the incident occurred about 20 hours outside of the 200 mile limit. Total data loss was 4.5 hours of no data and 35 hours of profiling with one gun.

Magnetometer: During the first two days of the leg, persistent noise appeared on the magnetometer record. No faulty electronic components could be found; the sensor was checked as well. The problem was finally isolated and corrected when the cable impedance was switched to a shorter cable length on the receiver and the noise disappeared. Total data loss amounted to three intervals of one, three and four hours.

Seabeam: During the first day the Seabeam system computer crashed at 1500Z (14 November). Repairs were made and logging began again at 2130Z the same day. The second day the system power supply failed, resulting in another six hour data gap (0900-1500Z, 15 November) while repairs were made. The swath plotter was also fixed, which had been down since the start due to a connector related problem. (See Seabeam Cruise Report, Appendix A)

Power: Towards the end of the leg we began to experience unexplained electromagnetic noise interference. The manifestations of this phenomenon included:

HF noise on magnetometer record
Random triggering of the event mark contact closure
Triggering of "paper out" alarm on computer printer in lab
Random advancing of the paper in the printer
Noisy radio reception on the bridge

Radiation from the DC drive powering the compressors was suspected of causing the noise; however, after the brushes were cleaned the problem remained. The DC drive finally failed at 1800Z on 28 Nov, and the hydraulic diesel power was engaged, without any noise abatement. No explanation was found for the phenomena. An oscilloscope was connected to the AC power line to check for power line noise but none was observed. No data loss resulted from the noise, just messy records.

Datalogger: No major incidents occurred while logging data on the data logger, however upon attempting to read data from the datalogger tapes it became apparent that there were problems with the acquisition program. One entire tape and portions of several other tapes were unreadable on both the Compaq 286 (Xenix/C) and Seabeam VAX computers. Because the Seabeam VAX acquires real time navigation information directly, there were no gaps in the navigation during these intervals. The magnetics data gaps have been digitized from the analog records. Upon examining the occurrence of gaps in the recording of the magnetic data on the datalogger, it became apparent that when the magnetometer recorder was turned off or to calibrate mode and the data stopped being sent to the datalogger, the datalogger would not recognize when the instrument was back on and sending data until the next tape had been loaded. The gravity data has many more gaps than the magnetics data; the data should be recoverable from the Bell tape. At this time it is not known whether or not the single channel seismic data was recorded without gaps, or if it can be recovered from the unreadable tape and portions of tapes. There were indications of problems with the datalogger system, usually the indication being a system crash. The system was closely monitored to minimize data loss. We experienced trouble with one of the Kennedy tape drives; Joe Stennet managed to put it back into proper working order.

Data Reduction: Onboard, psuedo-real time data reduction was an objective on this leg. A Bernoulli 20 Mb hard disk drive was installed on one of the Compaq 286 computers to enable data processing capabilities. Updated, PC compatible Brown book derived software was brought to the ship along with the Plotworks PLOT88 plotting package. Unfortunately, ASCII data files could not be obtained directly from the Datalogger tapes for use in these routines because of hardware and software problems with the Cipher tape drive dedicated to reading the Datalogger tapes. Although some data was obtained reading the tapes on the Xenix machine, it was necessary to change tactics and get the data from the Seabeam VAX over a serial line. All the Datalogger tapes were read into the Seabeam VAX on the ship to extract the magnetics and gravity files. Programs to convert the data to input files for Brown

book routines were written and the navigation and magnetics data were reduced onboard.

Results: The leg was highly successful in meeting the planned objectives. Figure 1 shows a track chart for the entire leg referenced to the GEBCO bathymetric map. The survey began at the beginning of the Agulhas Ridge, a narrow bathymetric feature which extends from approximately 15E, 40S to its intersection with the Meteor Rise, along the Agulhas Fracture Zone. The ridge appears as a discontinous series of isolated bathymetric highs on the DBDB2 digital bathymetric data set of the U.S. Navy, while it is mapped as a fairly linear continous feature on the GEBCO map of this region. On both maps the ridge acheives an elevation of about 2750 m depth. Our survey was planned to navigate down the bathymetric high of the ridge, based on the existing tracks in the area and the Seasat derived gravity field which exhibited a series of linear positive and negative anomalies of amplitude 40 mgal along the ridge. The survey revealed that the ridge exhibited a highly continuous character, with the exception of the southern end near the intersection with the Meteor Rise. Relief on the ridge was much greater than expected. The peak of the ridge was generally less than 2000 m depth, which indicates that it was at or above sea level when it was formed. The Agulhas Ridge must have been a formidable barrier to bottom water circulation in the Paleocene South Atlantic ocean.

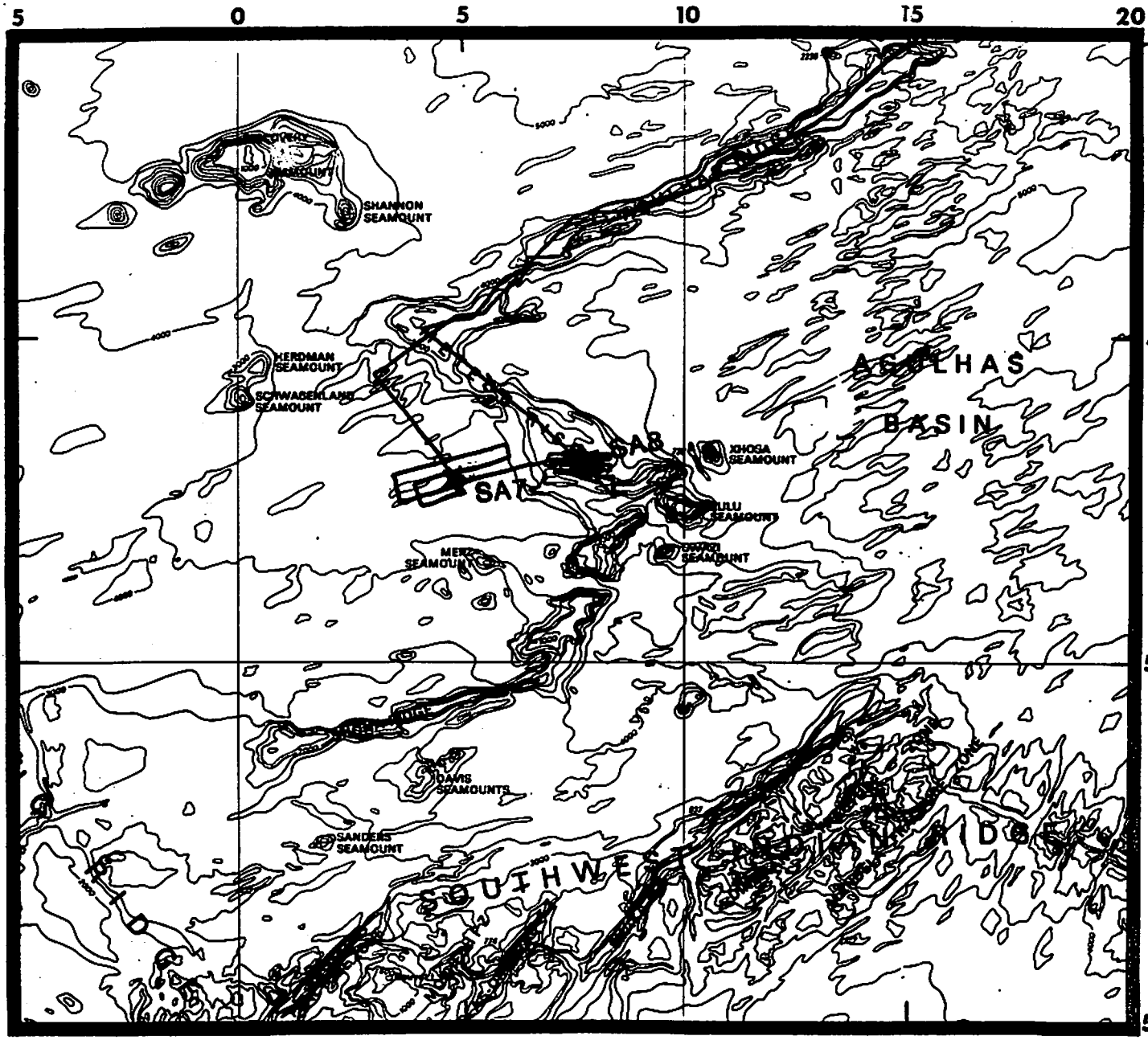
The next survey target was drill site SA-8 on the Meteor Rise. The axis of the Rise was surveyed, from the Agulhas Ridge to the southern edge of the Rise. This N-S line was tied into an existing Conrad NE-SW seismic profile across the Rise, which had imaged a small basin with approximately 500 meters of sediment. Because it appeared that most of the sediment lay to the south of the C1314 profile, and because time was a constraint, we restricted our detailed surveying effort to the southwestern quadrant of the Rise. A track chart of the Meteor Rise survey is shown in Figure 2. In this area we found an elliptically shaped basin of dimensions 70 km x 50 km with sediment thicknesses ranging from 200-1000 meters. A line was run up the axis of the basin to search for a good drilling site and to provide GPS navigated crossovers to constrain the navigation on the E-W lines. The last target of the Meteor Rise survey was a detailed look at a volcanic field on the eastern edge of the small basin atop the Rise.

After completing the survey of SA-8, we steamed WSW along a probable flow line for about 400 km to determine the magnetic anomaly sequence in order to establish the proper conjugate to SA-3, which was sited at Anomaly 21 on the western flank of the spreading center. A track chart of the SA-7 survey area is given in Figure 3. Anomalies were picked from psuedo-real time merged and processed magnetics plots. Figure 4 shows the magnetic anomaly profiles and identifications. Anomaly 21 was located by identification of the characteristic shape of Anomaly 24, and the relative spacings of the sequence 20-23. Three tracks extending from anomaly 20-24 were run with a spacing of 20 km, to insure there were no fracture zones crossing the area and to establish the lineation direction. A track was then run along the peak of Anomaly 21, in an attempt to find a region exhibiting a transparent sediment layer overlying basement, as was found on the western flank. The transparent layer was not found, although several unconformities were evident in the sediment package.

It is possible that the difference in seismic source between the two surveys (one 400 cu. in vs. two 80 cu. in. waterguns) is the cause of this discrepancy. At this point we were forced to abandon the site and begin the transit back to Capetown.

In areas of the Agulhas ridge where gaps in the relief had been observed on the way down (greater than 3000 m), the transit back was designed to search for areas of higher relief. In areas of continuous high relief we attempted to run a parellel track to increase the coverage. The inbound survey along the Agulhas Ridge revealed some additional local topographic highs, but failed to find any significantly greater relief at the southern end of the Ridge, near its intersection with the Meteor Rise. It is possible that the Ridge runs north of our track at its southern end.

At the northern termination of the Ridge, we continued east following the fracture zone trend to run a survey track requested by Dr. John Rodgers of the University of Capetown. We surveyed along this track until it was time to head to Capetown.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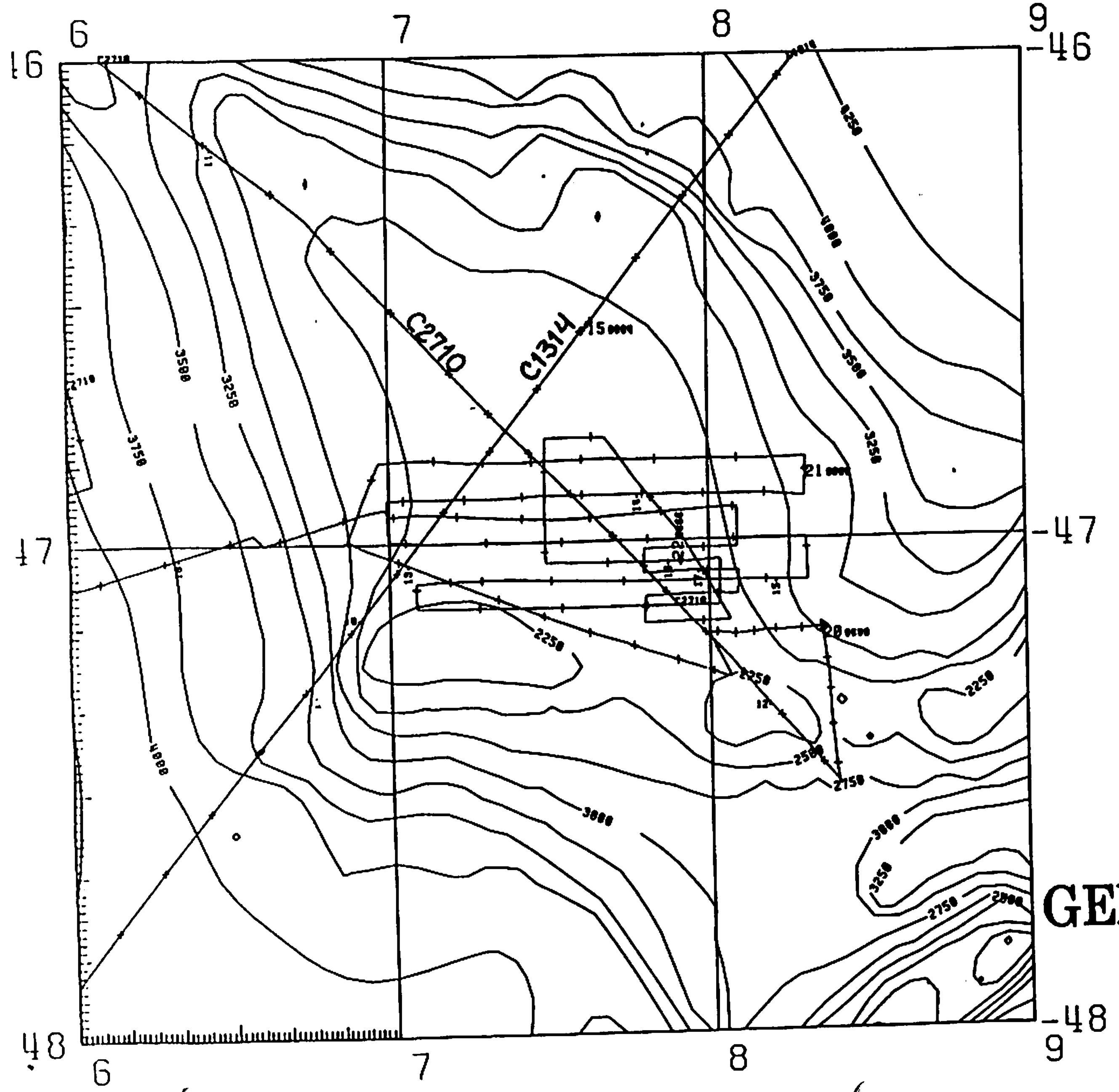
SCHWABENLAND SEAMOUNT
AGULHAS
BASIN
XHOSA SEAMOUNT
ULU SEAMOUNT
MERL SEAMOUNT
DAVIS SEAMOUNTS
SANDERS SEAMOUNT
SOUTHWE
RIDGE

Figure 1.



SA-8
GEBCO BATHYMETRY

Figure 2.

SA-7

GEBCO BATHYMETRY

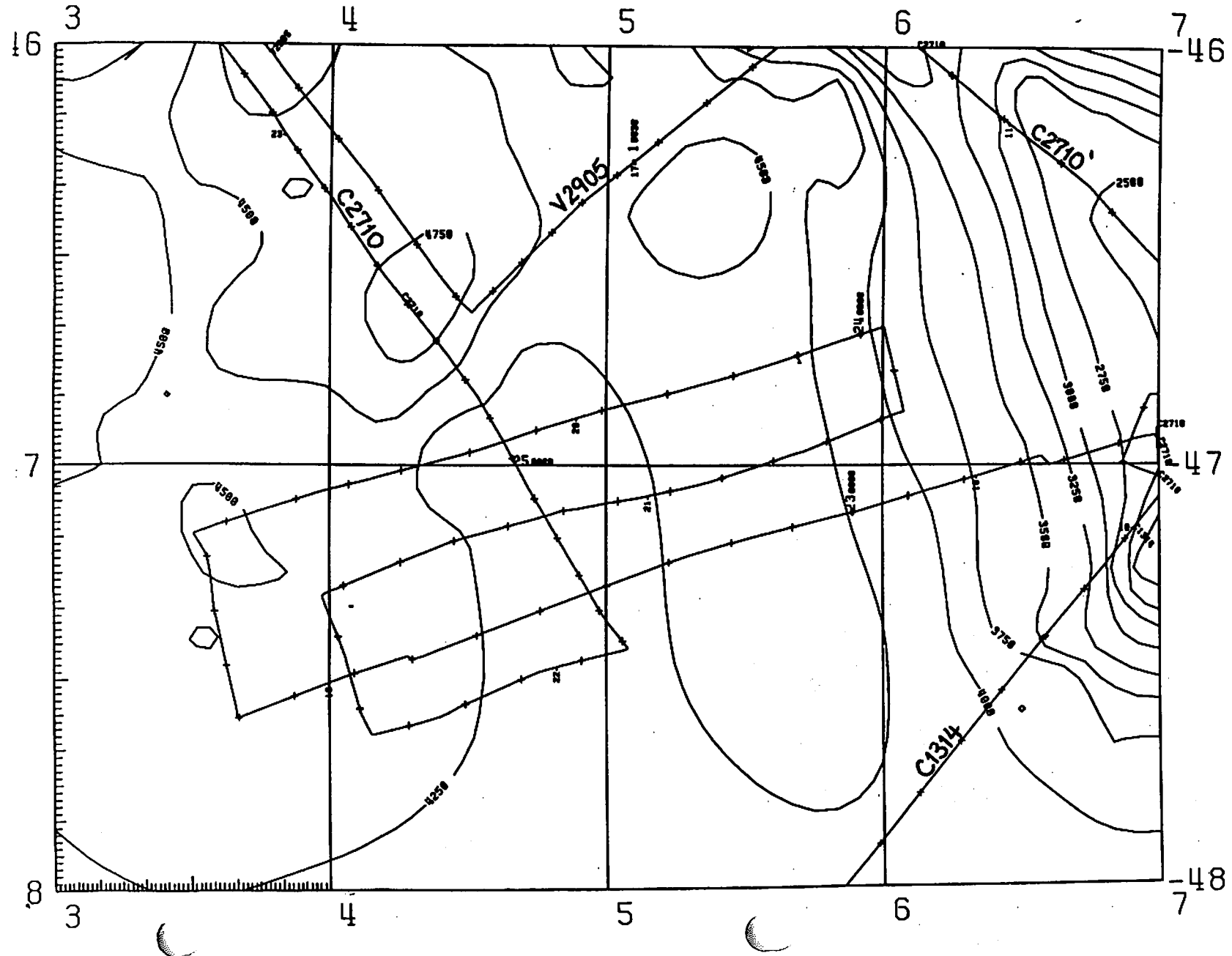


Figure 3.

SA-7
MAGNETICS

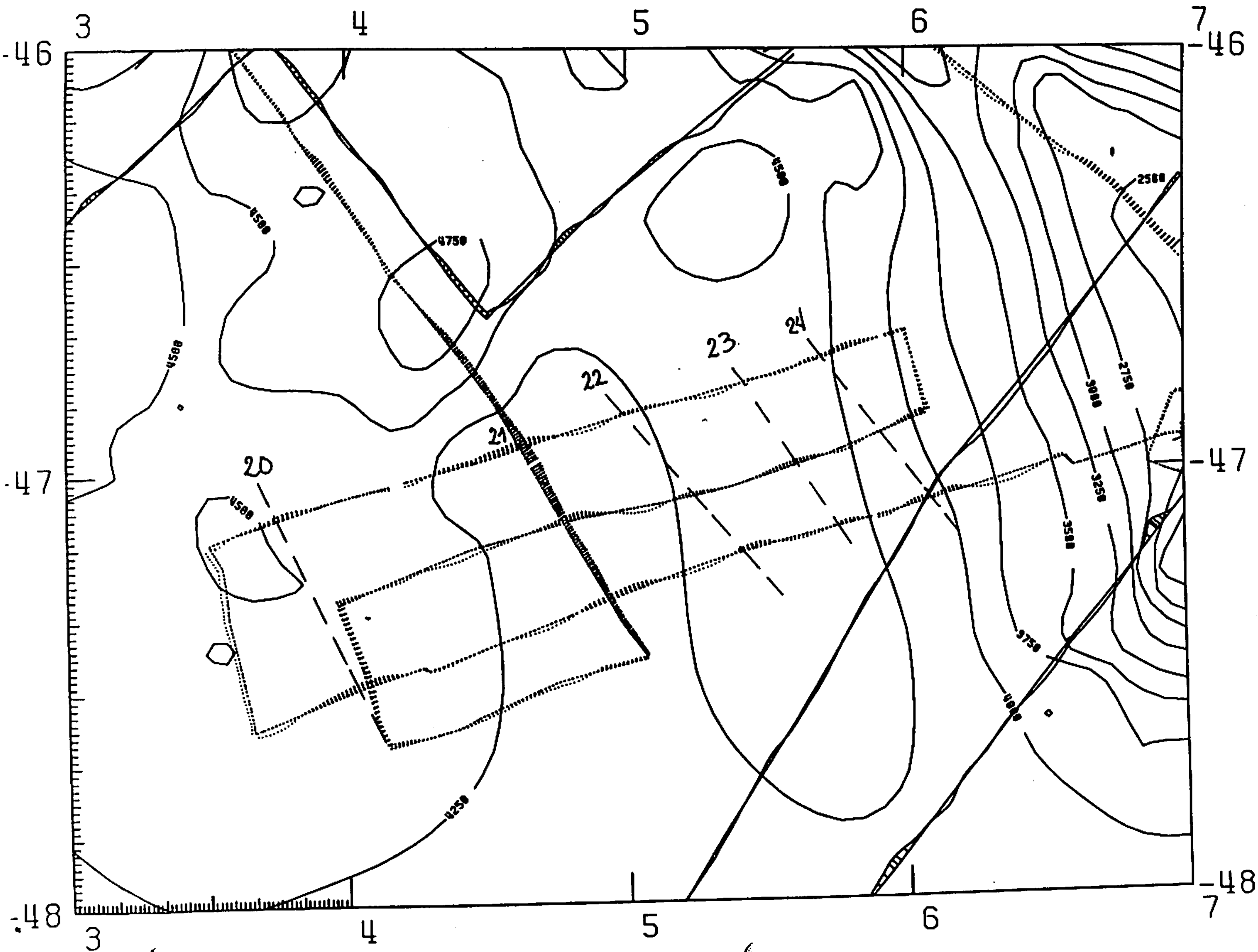


Figure 4.