CRUISE DATA REPORT, R/V ATLANTIS II 93 LEG 7

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Robert C. Gromau and Jane A. Dunworth

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3. Amirante Trench

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The R/V ATLANTIS II Cruise 93 Leg 7 left Port Louis, Mauritius, 8 April 1976 on a 29 day geophysical and geological survey in the Mascarene and Somali Basins in the Western Indian Ocean. Seventeen piston cores were successfully recovered in the Mascarene Basin, Amirante Trench and Somali Basin regions. Single channel continuous seismic profiles were made on 2920 km of ship's track in the Somali Basin. Echo soundings, total geomagnetic field and gravity field data were collected throughout the entire leg. (Cont. on back)
R/V ATLANTIS II arrived in Mombasa, Kenya, on 6 May 1976. We present here summary charts of the underway data collected during this cruise.
CRUISE DATA REPORT
R/V ATLANTIS II 93 LEG 7

by

Robert C. Groman and Jane A. Dunworth

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts 02543

April 1978

TECHNICAL REPORT

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Department of Geology and Geophysics
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Cruise Summary

The R/V ATLANTIS II Cruise 93 Leg 7 left Port Louis, Mauritius, 8 April 1976 on a 29 day geophysical and geological survey in the Mascarene and Somali Basins in the Western Indian Ocean. Table 1 lists the members of the scientific party. Seventeen piston cores were successfully recovered in the Mascarene Basin, Amirante Trench and Somali Basin regions. Table 2 summarizes these coring stations. Single channel continuous seismic profiles were made on 2920 km of ship's track in the Somali Basin. Echo soundings, total geomagnetic field and gravity field data were collected throughout the entire leg. The R/V ATLANTIS II arrived in Mombasa, Kenya, on 6 May 1976. For analysis of the data collected during this cruise see Bunce and Molnar (1977) and Johnson and Bunce (1977). We present here summary charts of the underway data collected during this cruise.

Data Acquisition and Processing

Navigation data, which consisted of satellite fixes, visual bearings and dead-reckoned positions, were acquired by the ship's officers and key-punched daily. A computer
program was used to plot these data on Mercator charts for verification by comparison with the bridge Mercator navigation plots. The incremental headings and speeds between successive fixes were determined and compared with the ship's log to access the accuracy of the plotted navigation points. A more complete navigation stream was obtained by merging the satellite navigation fixes with ship's velocity determined from a Doppler speed log and Sperry Mark 19 gyrocompass. Depths were measured primarily using a 3.5 kHz echo sounder recorded on a Hydroproducts recorder, and digitized by hand at five minute intervals or at every break-in-slope. During a few short intervals the 3.5 kHz system was down and a 12 kHz transducer was used instead. These data were then punched on paper tape and corrected for sound velocity via Matthews' Tables (1939) using a computer program. Total-field magnetic intensity was measured with a Varian proton precession magnetometer towed 250 meters behind the ship. One minute values were recorded, and the magnetic field anomaly was calculated by subtracting the International Geomagnetic Reference Field of 1975. The digital data were plotted as a function of elapsed time and corrected by comparison with the original analog records. Magnetic field data were not taken during
stations. Gravity measurements were made with a vibrating-string accelerometer on a gyro-stabilized table (Bowin et al., 1972) whose output was recorded as five-minute averages. Corrections were applied for Eotvos and instrumental drift, and the free air and simple Bouguer anomalies were calculated. The gravity and magnetic anomalies and bathymetry were then merged with the detailed navigation.

These data are available on magnetic tape and have been forwarded to the National Solar-Terrestrial Data Center in Boulder, Colorado.

Data Summary Plots

Figure 1 shows a summary of the ship's track. In order to display the data coverage to better advantage, we have divided the cruise into four areas. Figures 2a-d display the date at change of day and time ticks every six hours. Station locations and seismic coverage are indicated as shown. Figures 3a-d show corrected meters plotted at right angles to the ship's track. The plotting scales are 0.8 inches per degree of longitude and 2000 meters per inch. The ship's track represents a depth of 4000 meters. Figures 4a-d show the total geomagnetic field anomaly plotted
at right angles to the ship's track. The plotting scales are 0.8 inches per degree of longitude and 1000 gammas per inch. The ship's track represents 250 gammas in order to remove a positive bias. Figures 5a-d showing the gravity free air anomaly are plotted at 0.8 inches per degree of longitude and 250 milligals per inch.

Acknowledgements

Support for this cruise came from the Oceanography Section, National Science Foundation, through Grant 21522. We gratefully acknowledge the help of Captain David Casiles and the entire crew and other members of the scientific party. Thanks are due to L. Whiteley for her contribution of figure 1 and J. Broda for the preparation of table 2.
References


Leaton, B.R., I.A.G.A. division 1, study group, in EOS 57, pp. 120-121, 1976.
Table 1: Scientific Party

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<thead>
<tr>
<th>Name</th>
<th>Affiliation if other than W.H.O.I.</th>
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<tbody>
<tr>
<td>E.T. Bunce, Chief Scientist</td>
<td></td>
</tr>
<tr>
<td>J. Broda</td>
<td></td>
</tr>
<tr>
<td>E. Carter</td>
<td></td>
</tr>
<tr>
<td>R. Goldsborough</td>
<td></td>
</tr>
<tr>
<td>P. Goreau</td>
<td></td>
</tr>
<tr>
<td>R.C. Groman</td>
<td></td>
</tr>
<tr>
<td>B.U. Haq</td>
<td></td>
</tr>
<tr>
<td>D.A. Johnson</td>
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</tr>
<tr>
<td>G. Marshall</td>
<td></td>
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<tr>
<td>P. Molnar</td>
<td></td>
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<tr>
<td>C. Polloni</td>
<td></td>
</tr>
<tr>
<td>E. Young</td>
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</tr>
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</table>

M.I.T. and W.H.O.I.

W.H.O.I.-M.I.T. Joint Program Student

University of Alberta, Guest Student Investigator

M.I.T. Staff
Table 2.
AII 93 LEG 7 STATION SUMMARY

<table>
<thead>
<tr>
<th>Station No. and Type</th>
<th>Date</th>
<th>Physiographic Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Length PC: piston core</th>
<th>Depth in Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>(21) Piston Core (4 PC)</td>
<td>10 April 76</td>
<td>Northern Mascarene Basin</td>
<td>15°17.4'S</td>
<td>53°31.5'E</td>
<td>PC: 970 cm</td>
<td>4641</td>
</tr>
<tr>
<td>(22) Piston Core (5 PC)</td>
<td>11 April 76</td>
<td>Northern Mascarene Basin</td>
<td>11°01.2'S</td>
<td>54°29.9'E</td>
<td>PC: 1088 cm</td>
<td>4599</td>
</tr>
<tr>
<td>(23) Piston Core (6 PC)</td>
<td>14 April 76</td>
<td>Southern Amirante Trench</td>
<td>09°28.5'S</td>
<td>52°23.8'E</td>
<td>PC: 554 cm</td>
<td>4196</td>
</tr>
<tr>
<td>(24) Piston Core (7PC)</td>
<td>14 April 76</td>
<td>Southern Amirante Trench</td>
<td>09°33.2'S</td>
<td>52°31.5'E</td>
<td>PC: 1180 cm</td>
<td>3726</td>
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<tr>
<td>(25) Piston Core (8PC)</td>
<td>14 April 76</td>
<td>Southern Amirante Trench</td>
<td>09°29.24'S</td>
<td>52°28.61'E</td>
<td>PC: 1080 cm</td>
<td>3888</td>
</tr>
<tr>
<td>(26) Piston Core (9PC)</td>
<td>15 April 76</td>
<td>Mud Waves: West Flank of Amirante Trench</td>
<td>09°26.5'S</td>
<td>51°57.7'E</td>
<td>PC: 1034 cm</td>
<td>4116</td>
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<tr>
<td>(27) Piston Core (10PC)</td>
<td>15 April 76</td>
<td>Abyssal Plain, Western Margin of Amirante Trench</td>
<td>09°24.8'S</td>
<td>52°01.5'E</td>
<td>PC: 972 cm</td>
<td>4129</td>
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<tr>
<td>(28) Piston Core (11PC)</td>
<td>15 April 76</td>
<td>Abyssal Plain, Western Margin of Amirante Trench</td>
<td>09°28.4'S</td>
<td>52°09.9'E</td>
<td>PC: 439 cm</td>
<td>4154</td>
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<tr>
<td>(29) Piston Core (12PC)</td>
<td>16 April 76</td>
<td>Southern Amirante Trench</td>
<td>09°30.7'S</td>
<td>52°26.3'E</td>
<td>PC: 729 cm</td>
<td>4148</td>
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<tr>
<td>(30) Piston Core (13PC)</td>
<td>16 April 76</td>
<td>Hill on Western Flank of Amirante Trench</td>
<td>09°32.5'S</td>
<td>52°28.6'E</td>
<td>PC: 846 cm</td>
<td>3975</td>
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Table 2 (continued)

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<tr>
<th>Station No. and Type</th>
<th>Date</th>
<th>Physiographic Location</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Length</th>
<th>Depth in Meters</th>
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<tr>
<td>(31) Piston Core (14PC)</td>
<td>17 April 76</td>
<td>Channel Along Western Margin of Amirante Trench</td>
<td>09°29.9'S</td>
<td>52°22.9'E</td>
<td>PC: 839 cm</td>
<td>4471</td>
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<td>PG: 94 cm</td>
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<td>(32) Piston Core (15PC)</td>
<td>18 April 76</td>
<td>Southern Somali Basin</td>
<td>07°16.5'S</td>
<td>50°08.9'E</td>
<td>PC: 1123 cm</td>
<td>4444</td>
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<td>PG: 125 cm</td>
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<tr>
<td>(33) Piston Core (16PC)</td>
<td>20 April 76</td>
<td>Southern Somali Basin</td>
<td>07°15.4'S</td>
<td>49°32.2'E</td>
<td>PC: 275 cm</td>
<td>2490</td>
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<tr>
<td>(34) Piston Core (17PC)</td>
<td>1 May 76</td>
<td>Central Somali Basin</td>
<td>02°03.8'N</td>
<td>52°23.9'E</td>
<td>PC: 944 cm</td>
<td>5115</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PG: 138 cm</td>
<td></td>
</tr>
<tr>
<td>(35) Piston Core (18PC)</td>
<td>1 May 76</td>
<td>Central Somali Basin</td>
<td>00°32.5'N</td>
<td>51°36.1'E</td>
<td>PC: 891 cm</td>
<td>5109</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>PG: 151 cm</td>
<td></td>
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<tr>
<td>(36) Piston Core (19PC)</td>
<td>2 May 76</td>
<td>Central Somali Basin</td>
<td>01°01.8'S</td>
<td>50°57.1'E</td>
<td>PC: 827 cm</td>
<td>5089</td>
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<td>PG: 102 cm</td>
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<tr>
<td>(37) Piston Core (20PC)</td>
<td>2 May 76</td>
<td>Central Somali Basin</td>
<td>02°01.8'S</td>
<td>50°32.9'E</td>
<td>PG: 156 cm</td>
<td>5080</td>
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<td>PC: no recording</td>
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Table 3

Seismic Reflection Profiling Dates and Times
(time in GMT)

Mascarene Basin

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<tr>
<th>Start</th>
<th>End</th>
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<tr>
<td>11 April 1978 - 2000</td>
<td>14 April 1978 - 0415</td>
</tr>
<tr>
<td>14 April 1978 - 1630</td>
<td>15 April 1978 - 1400</td>
</tr>
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<td>16 April 1978 - 1000</td>
<td>16 April 1978 - 1630</td>
</tr>
<tr>
<td>17 April 1978 - 0500</td>
<td>18 April 1978 - 1115</td>
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Somali Basin

<table>
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<tr>
<th>Lines 1-30</th>
<th>22 April 1978 - 0300</th>
<th>30 April 1978 - 1730</th>
</tr>
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<tr>
<td>Line 31</td>
<td>3 May 1978 - 1045</td>
<td>4 May 1978 - 0230</td>
</tr>
</tbody>
</table>
FIGURE 2A:
DETAIL NAVIGATION CHART, 0.8” PER DEGREE OF LONGITUDE

- = STATION
\_ = SEISMIC PROFILING
Figure 2B:
Detail Navigation Chart, 0.8" per degree of longitude
FIGURE 2C:
DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE

- = STATION
| = SEISMIC PROFILING
FIGURE 2D:
DETAIL NAVIGATION CHART, 0.8" PER DEGREE OF LONGITUDE
FIGURE 3A:
CORRECTED METERS AT 2000 METERS PER INCH.
SHIP'S TRACK EQUALS 4000 METERS.
FIGURE 3C:
CORRECTED METERS AT 2000 METERS PER INCH.
SHIP'S TRACK EQUALS 4000 METERS.
Figure 3D: Corrected meters at 2000 meters per inch.
FIGURE 4A: TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.
FIGURE 4B:
TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.
FIGURE 4C:
TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.
FIGURE 4D:

TOTAL GEOMAGNETIC FIELD ANOMALY AT 1000 GAMMAS PER INCH. SHIP'S TRACK EQUALS 250 GAMMAS.
FIGURE 5A:

GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.
FIGURE 5B:
GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.
FIGURE 5C:
GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.
FIGURE 5D:
GRAVITY FREE AIR ANOMALY AT 250 MILLIGALS PER INCH.
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3. Antartic Trench
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5. Dunsworth, Jane A.
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