Sawyer, D.S., Whitmarsh, R.B., Klaus, A., et al., 1994
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3. UNDERWAY GEOPHYSICS[1]

Shipboard Scientific Party[2]

EQUIPMENT AND METHODS

Navigation

Primary navigation data were acquired during Leg 149 using a Magnavox Transit/Global Positioning System (GPS) Satellite Navigator, Model MX1107 GPS, which is located in the Underway Geophysics Laboratory. The receiving aerial is located 28 m forward of the stern, 45 m aft of the drill floor, and 89 m aft of the ship's bridge navigation system aerial. GPS position fixes were available on an essentially continuous basis. All fixes, together with course and speed information, were recorded digitally at various time intervals (depending on whether we were acquiring seismic reflection data or transitting between sites) using a Masscomp 561 computer system. A realtime navigation display program, AGCNAV, proved useful while re-occupying existing seismic track lines and for deploying beacons.

Bathymetry

Bathymetric data were acquired using both 3.5- and 12-kHz systems. Data for both systems were displayed using Raytheon Model 1807M line scanning recorders (LSR). The 3.5-kHz system used an EDO 248C transceiver, while the 12-kHz system used a Raytheon PTR105B transceiver to drive an EDO 323B transducer. Transducers for both systems are mounted in a sonar dome for improved noise conditions at high ship's speed and in rough weather conditions. Depth readings were recorded manually every 5 min for post-cruise merging with navigation. Preliminary onsite water depths were estimated using data from the 12-kHz system.

Magnetic Field Intensity

Measurements of total magnetic field intensity were collected along the ship's track using a Geometries 801 proton-precession magnetometer. The sensor was towed approximately 400 m behind the ship. Observations were made at 3-s intervals with a sensitivity of about 1 nT. Values were digitally recorded on the Masscomp computer at the same intervals as the navigation. Manual log entries of magnetic field intensity were made every 5 min. Magnetic field intensity data were processed after the cruise to remove the regional field using the IGRF-90.

Seismic Reflection Profiling

Two Seismic Systems, Inc., 200-in.^{3} water guns were towed approximately 14m apart and approximately 24 m behind the stern. The guns were towed at a depth of about 13m. They were fired simultaneously at approximately 2000 psi (13.8 MPa) at uniform time intervals of 17 or 12 s. The ship's speed was about 5 kt. A 100-m Teledyne Model 178 hydrophone streamer, containing 60 active hydrophones, was towed at a depth of 15-20 m. The midpoint of the streamer lay 370 m astern.

Analog seismic reflection data were displayed on two Raytheon Model 1807M LSR recorders. The signal from the streamer was amplified and bandpass filtered at 25 to 150 Hz (Recorder 1) or 15 to 150 Hz (Recorder 2) before display. The seismic reflection data were recorded digitally on a Masscomp computer using the HIGHRES software package. The data were recorded in SEG-Y format at 1600 bpi.

Acquisition of Underway Geophysical Data During Leg 149

Charts of the ship's track while underway data were being acquired are shown in Figures 1 through 3. Table 1 indicates when and what types of underway geophysical data were acquired. Intervals of seismic reflection profile acquisition are discussed below.

Seismic Acquisition Along Line 2

The portion of Line 2 along which seismic data were acquired was a site approach survey acquired before deploying a beacon at proposed Site IAP-4 (which became Site 897) (Fig. 2). This seismic reflection profile (Fig. 4, backpocket foldout) is called Line 149-2 throughout this volume. We re-occupied a portion of Sonne Line 75-16, which passed through the proposed site. Our objective was to check the location of the site by comparing our seismic data and navigation with those of the *Sonne* survey. We determined that our new seismic data agreed well with those acquired earlier and that we could confidently deploy a beacon at the site. The bathymetric data were largely featureless, with the exception of an apparent seafloor step upward to the east by about 7 m (Fig. 8 in "Site 897" chapter, "Site Geophysics" section, this volume). The feature was visible on Sonne Line 75-16, but some of us had previously interpreted it as a timing artifact.

Seismic Acquisition Along Line 3

The portion of Line 3 along which seismic data were acquired was shot on 17-18 April 1993 (Fig. 2), before we departed the study area for the mid-leg port call in Lisbon. We had completed drilling and logging operations at Site 897 and, because of the deep water, no time was available for more drilling. This seismic reflection profile (Fig. 5, backpocket foldout) is called Line 149-3 throughout this volume. Our objectives for the seismic data acquisition were (1) to obtain a profile over proposed Site IAP-3C (which we did not end up drilling during the leg), (2) to obtain a profile over proposed Site IAP-2 (which became Site 898), and (3) to obtain profiles to fill two gaps in the existing seismic-reflection profile coverage in the study area. We acquired a profile across Site IAP-3C, re-occupying a portion of Sonne Line 75-16. While shooting from west to east, roughly between Sites 897 and IAP-2 (Site 898), we identified a previously unmapped acoustic basement high that came to within 490 m of the seafloor. After surveying Site IAP-2 (Site 898) and re-occupying a portion of Lusigal Line 12, we altered the originally planned track to cross the new basement high again, this time from south-southwest to north-northeast. At the time, this basement high seemed just like an interesting addition to the map of basement depth in the area. After the loss of about 3.3 km of drill string at Site 898, which left us with insufficient drill string to achieve our basement objectives there, we elected to drill on the new basement high, which then became Site 899.

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[1] Sawyer. D.S., Whitmarsh, R.B., Klaus, A., et al., 1994. *Proc. ODP, Init. Repts.,* 149: College Station, TX (Ocean Drilling Program).
[2] Shipboard Scientific Party is as given in list of participants preceding the contents.

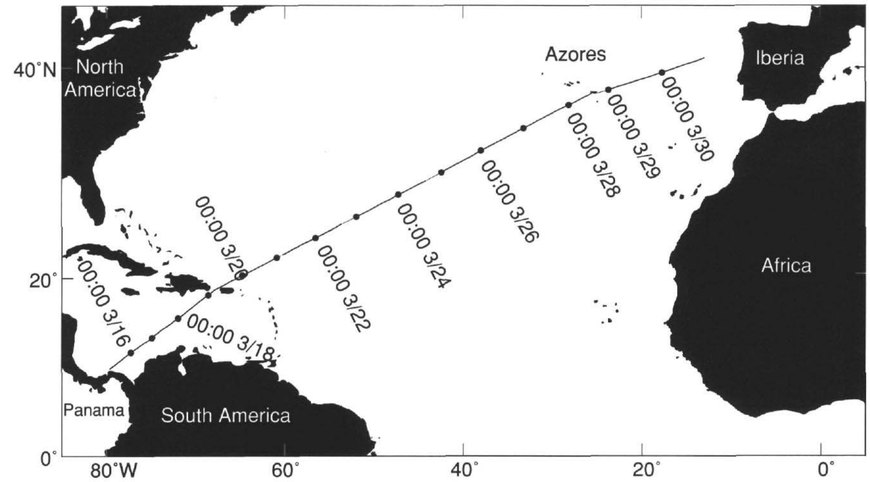

Figure 1. Chart of ship's track for *JOIDES Resolution* transits from Panama City to Ponta Delgada, and Ponta Delgada, to the start of seismic reflection profiling near Site 897.

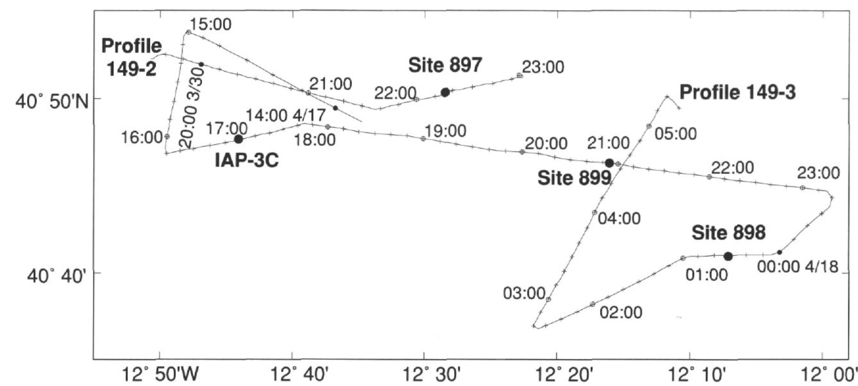

Figure 2. Chart of ship's track for *JOIDES Resolution* during acquisition of reflection seismic profiles 149-2 and 149-3.

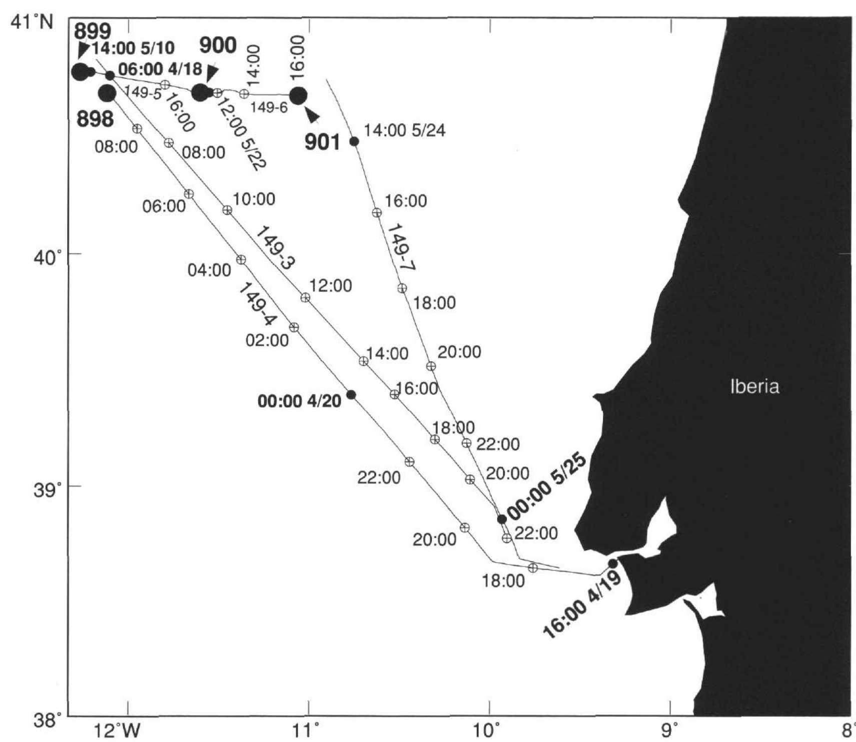

Figure 3. Chart of ship's track for *JOIDES Resolution* transits from Leg 149 sites to and from Lisbon.

Table 1. Intervals of underway geophysical data acquisition during Leg 149.

			Bathymetry		Magnetometer		Seismic	
Subleg	Line no.	From/To	Date	Time	Date	Time	Date	Time
149A	1	Panama/Azores	15–28 March	0450–0900	15–28 March	0500–0900	None	
149B	2	Azores / Site 897	28–30 March	1730–2349	28–30 March	1830–2200	30–30 March	1505–0515
149B	3	Site 897 / Lisbon	17–19 April	1330–0053	17–18 April	1400–2100	17–18 April	1900–2236
149C	4	Lisbon / Site 898	20–20 April	0515–1010	None		None	
149C	5	Site 899 / Site 900	10–10 May	1410–1800	10–10 May	1532–1609	None	
149C	6	Site 900 / Site 901	22–22 May	1325–1700	None		None	
149C	7	Site 901 / Lisbon	24–25 May	1210–0100	24–25 May	1210–0000	None	

Figure 4. Reflection profile 149-2.
Ocean Drilling Program
Leg 149
Line 2

Field Parameters	
Date recorded:	30 March 1993
Vessel:	*JOIDES Resolution*
Source type (Nominal shot spacing):	2 x 200 in.3 water gun, 2000 psi
Source interval:	12 s (31 m)
Ship's speed:	5 kt
Sample rate:	1 ms
Record end time:	10 s
Offset:	345 m
Low cut filter:	20 Hz
High cut filter:	250 Hz
Instruments:	Single-channel Teledyne Model 178 hydrophone
Format:	SEG-Y
Number data chans:	1
Processing Sequence	
Trace length extended:	10 s
Recording delay removed:	6 s
Filter type:	Butterworth
Filter parameters:	30, 18, 170,18
Automatic gain control:	200 ms
Trace mix:	(1, 2, 1)
Decimation for plotting:	4
Water bottom mute:	
Display:	2 cm =1 km
Display Parameters	
Bias % = 0	Traces/cm = 64.864
Gain set = 2	cm/s = 5
Gain constant = 1.75.04	RMS amplitude = 0.930194

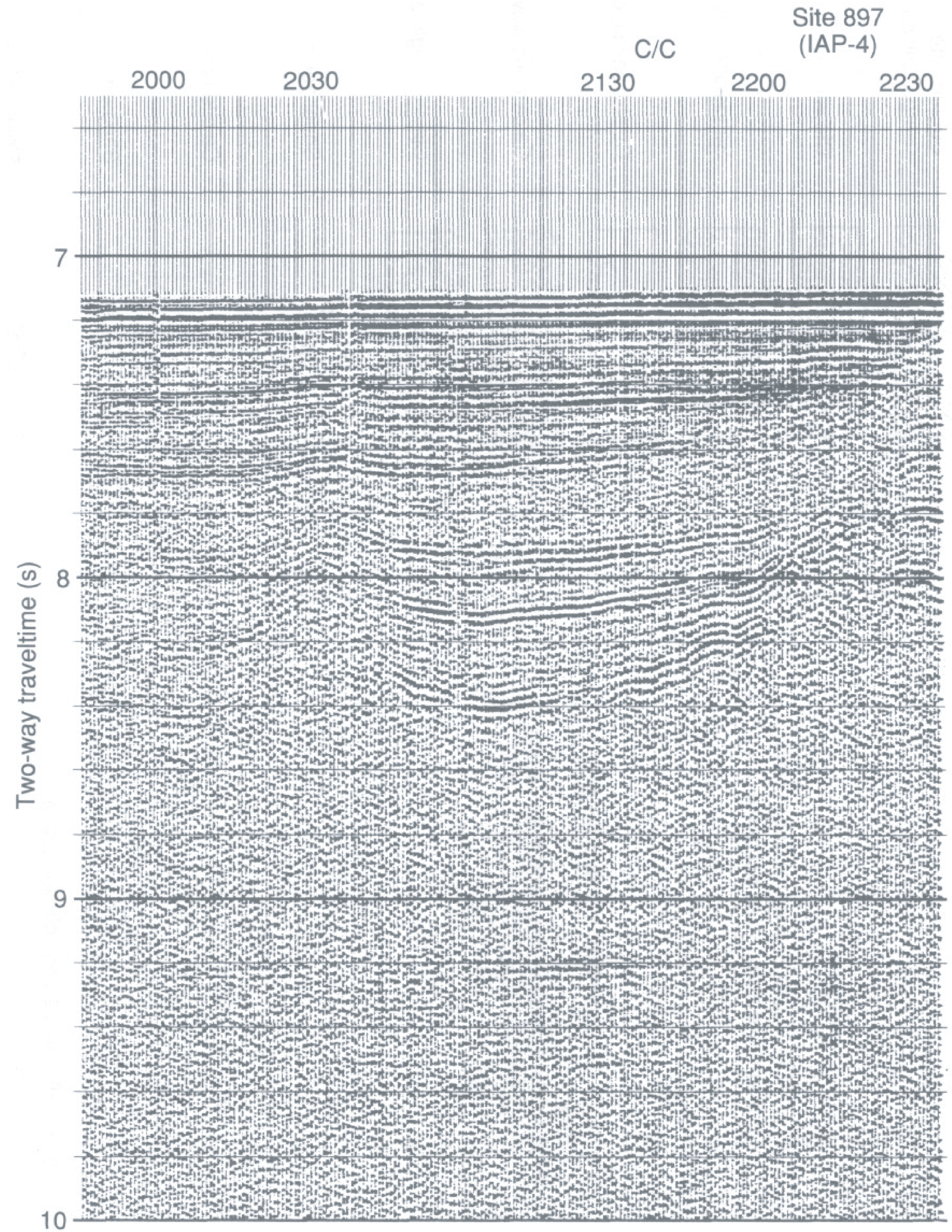

Figure 5. Reflection profile 149-2.

Ocean Drilling Program
Leg 149
Line 3

Field Parameters	
Date recorded:	17-18 April 1993
Vessel:	*JOIDES Resolution*
Source type:	2 × 200 in.3 water gun, 2000 psi
Source interval (Nominal shot spacing):	BOL-16:27 14 s (36m), 16:27-16:29 13 s (34m), 16:29-EOL12s (31m)
Ship's speed:	5 kt
Nominal shot spacing:	36 m, 34 m, 31 m
Sample rate:	1 ms
Record end time:	10 s
Offset:	345 m
Low cut filter:	20 Hz
High cut filter:	250 Hz
Instruments:	Single-channel Teledyne Model 178 hydrophone
Format:	SEG-Y
Number data chans:	1
Processing Sequence	
Trace length extended:	10 s
Recording delay removed:	6 s
Filter type:	Butterworth
Filter parameters:	30,18,170,18
Automatic gain control:	200 ms
Trace mix:	(1,2,1)
Decimation for plotting:	4
Water bottom mute:	
Display:	2 cm =1 km
Display Parameters	
Bias % = 0	Traces/cm = 64.864
Gain set = 2	cm/s = 5
Gain constant = 1.75.04	RMS amplitude = 0.930194