OCEAN DRILLING PROGRAM

LEG 141 SCIENTIFIC PROSPECTUS

CHILE TRIPLE JUNCTION

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This Scientific Prospectus is based on pre-cruise site-survey information and JOIDES panel discussions. The operational plans within reflect JOIDES Planning Committee and thematic panel priorities. During the course of the cruise, actual site operations may indicate to the Co-Chief Scientists and the Operations Superintendent that it would be scientifically advantageous to amend the plan detailed in this prospectus. It should be understood that any proposed changes to the plan presented here are contingent upon approval of the Director of the Ocean Drilling Program in consultation with the Planning Committee and the Pollution Prevention and Safety Panel.

Abstract

The primary objective of ODP Leg 141 is to investigate the processes associated with the subduction of an active spreading ridge along the margin of Southern Chile, including: 1) rapid uplift and subsidence of the arc and forearc, 2) high levels of regional metamorphism and elevated thermal gradients, 3) a hiatus in arc magmatism, 4) anomalous near-trench and forearc magmatism, and 5) localized subsidence and extensional deformation of the forearc in the region of the collision. Also, alteration, diagenesis, and mineralization of forearc materials can be expected, driven by the hot fluids venting from the subducting spreading ridge.

A secondary objective of ODP Leg 141 is to investigate the physical properties and geochemistry of gas hydrates in oceanic sediments. Bottom Simulating Reflectors (BSRs), likely produced by frozen gas hydrate layers in the shallow sub-bottom, are common on seismic reflection profiles from the region.

Background and Regional Setting

The Chile margin triple junction represents the only presently active ridge-trench collision where the overriding plate is composed of continental lithosphere. Hence, this region provides the only active modern example of the geological results of ridge subduction along continental margins, a process that has dramatically affected the geology of Tertiary western North America (Atwater, 1970; Dickinson and Snyder, 1979), among other places. Regional plate-tectonic reconstructions for the southern Chile triple junction are well constrained by marine magnetic anomaly studies (Cande et al., 1987), so the detailed relationships between plate motions and continental-margin geology can be effectively studied here. These reconstructions show that the Chile Ridge first collided with the Chile Trench about 14 Ma near the latitude of Tierra del Fuego. A long ridge segment was subducted between Tierra del Fuego and the Golfo de Penas between roughly 10 and 14 Ma (Fig. 1), another ridge segment was subducted adjacent to the Golfo de Penas (and perhaps partially overlapping with the Taitao Peninsula) about 6 Ma, and a short ridge segment was subducted adjacent to the Taitao Peninsula about 3 Ma.

The relative plate-motion vectors change considerably following the passage of the triple junction along the margin. Prior to the ridge collision the Nazca plate was being subducted at a rapid rate (roughly 80 mm/yr for the past 3 m.y., and as fast as 130 mm/yr during the late Miocene) in a direction slightly north of east. Following the passage of the triple junction, the Antarctic plate is subducted at a much slower rate, roughly 20 mm/yr for the past 15 m.y., in a direction slightly south of east (Chase, 1978).

The Nazca/Antarctic plate boundary comprises the Chile Ridge spreading center, which intersects the Chile Trench at 46°12'S, forming a ridge-trench-trench triple junction (McKenzie and Morgan, 1969). Swath bathymetric data delineate the present-day geometry and location of the ridge-trench collision. North of about 46°12'S, the Nazca plate is being subducted beneath the South American plate. South of that latitude the Antarctic plate is being subducted beneath South America. The spreading ridge strikes nearly parallel to the trench, resulting in a highly oblique ridge-trench collision, while the fracture zones associated with the Chile Ridge spreading system trend within about 20° perpendicular to the trench. The triple-junction region appears to have formed the southern limit of coseismic rupture during the great 1960 $M_w = 9.1$ Chile earthquake (Plafker and Savage, 1970).

The on-land geology of southern Chile, while not mapped in detail, is reasonably well known at a regional level (Geological Map of Chile, 1980), and local areas near the triple junction have been the subject of recent field work (Forsythe and Nelson, 1985). Exposures in the area near the triple junction are dominated by four principal lithologies: 1) pre-Late Jurassic metamorphic rocks, forming pre-Andean South American basement, 2) the largely Mesozoic Patagonian batholith, 3) Mesozoic and Cenozoic volcanic rocks associated with the Patagonian batholith, and 4) Neogene sedimentary and igneous rocks (Geological Map of Chile, 1980; Forsythe and Nelson, 1985). Additionally important but areally limited rock types include an unusual suite of young (Pliocene to Pleistocene) granodioritic plutons in and around the Golfo Tres Montes within about 20 km of the trench axis and about 150 km *seaward* of the main axis of the Quaternary Andean volcanic arc, and a tilted but apparently coherent Pliocene ophiolite sequence on the Taitao Peninsula (Forsythe et al., 1986).

Scientific Objectives

The drilling objectives for the southern Chile margin are focused on the effects of ridge-crest subduction. Geophysical studies suggest that the major effect of the collision is that gradually accelerating tectonic erosion, manifested by rapid subsidence of the forearc, dominates the processes acting along the margin before the ridge crest arrives at the trench, culminating in a period of rapid tectonic erosion when the ridge is subducted, followed by a period of subduction accretion that "rebuilds" the forearc. The basic objectives of the drilling program are to 1) test this model of "accelerated subduction erosion" and 2) explore the mechanisms responsible for subduction erosion.

The basic strategy that serves as the foundation of the proposed Chile margin drilling closely follows a "dual approach" strategy: 1) to determine the *time-space distribution of materials in the forearc* to constrain geometries and kinematics of materials, and 2) to make *in situ measurements of physical, chemical, and geological parameters* to provide information about the processes operating in the forearc. Specific questions to address in the triple-junction region include:

1) What are the *timing, rates, amplitude, and regional extent of vertical motion* within the forearc that result from the ridge/trench collision?

2) Where is the *seaward limit of continental crust* along the Chile margin forearc in the vicinity of the ridge/trench collision?

3) What are the *nature, petrology, distribution, and chemical affinities for near-trench volcanism* associated with the ridge-trench collision?

Drilling Strategy

Drill sites have been selected so that two transects of the ridge/trench collision zone will be drilled: a downdip transect along CDP Line 745 consisting of three sites (SC-1, SC-2, and SC-3), and a strike transect along the base of the trench slope (SC-3, SC-4, and SC-5). The combination of these five sites will provide a three-dimensional perspective on the effects of ridge subduction at the Chile margin. Site SC-6 will be drilled on the Taitao Ridge if time permits.

A second downdip transect, consisting of Sites SC-7, SC-8, and SC-9, with alternate sites SC-7' and SC-9', is located along CDP Line 769, south of the present location of the triple junction. This transect is designed to determine the extent to which subduction erosion truncated this segment of the margin; it wil be drilled if time remains on the leg after completing operations at SC-1 through SC-5.

Sites SC-1, SC-2, and SC-3 are all located in areas where Bottom Simulating Reflectors (BSRs) are imaged by the seismic reflection profiles. Also, sites at the base of the trench slope, SC-3, SC-4, and SC-5, are located in regions of high geothermal gradients, and may encounter temperatures of approximately 200°C at T.D.

No sites are planned as reentry holes, but the ability to deploy mini-cones to provide for bit replacement is an important option that will be available.

Site Descriptions

1) The East-West Transect of the Collision Zone

Three sites are located along Line 745 (Fig. 2; line location shown in Fig. 3), one near the base of the trench slope (Site SC-3), one in the mid-slope region (Site SC-2), and one on the upper slope of the margin (Site SC-1). The basic drilling objectives at each site include 1) determining the lithologies and depositional environment of the sediment sequences and 2) determining the vertical-motion history at each site. In addition, at Site SC-3, at the base of the trench slope, we expect to sample lithologic units that have been modified by hydrothermal circulation and near-trench volcanism and to see structural fabrics and deformation caused by the close proximity to the ridge axis.

2) Sites Near the Rift Axis

Two sites are positioned on the lowermost trench slope adjacent to the rift axis. Site SC-4 (Fig. 4) is situated in the rift contact zone immediately adjacent to the rift axis, while Site SC-5 (Fig. 5) is situated over the rift axis in the subducted rift zone. The objective at both SC-4 and SC-5 is to sample lithologies that have been modified by hydrothermal circulation from the ridge axis. An additional objective at Site SC-4 is to verify the extent of tectonic erosion by drilling into the prominent basement reflector beneath the site. At Site SC-5, an additional objective is to determine the age and nature of the accreted material above the subducted ridge axis.

3) Ophiolite Obduction at the Taitao Ridge

Site SC-6 is located on the crest of the Taitao Ridge (Fig. 6). The objective at this site is to determine the relationship between this feature and the Taitao ophiolite. If the Taitao Ridge is simply an offshore extension of the ophiolite exposed on land, we would expect to find both geochemical and stratigraphic similarities between the two. If the Taitao Ridge is an independent fragment of oceanic crust being emplaced into the margin, then we can investigate the timing and mechanisms of ophiolite emplacement with the Taitao Ridge as an example.

4) Development of the Outer-Arc High

Sites SC-7, SC-8, and SC-9 are located along Line 769 (Fig. 7; line location shown in Fig. 8). These sites are intended to sample the materials involved in the oldest part of the accretionary complex that has developed following the ridge/trench collision. SC-9 and SC-9' will determine the physical properties of the deforming accretionary prism as well as date the onset of deformation here. In addition, SC-7 and SC-7', located on the upper slope of the margin, will determine the age and nature of the basement reflector along this section of the margin. SC-8 will sample the sediment sequence that might represent the seawardmost remnant of the forearc prior to the ridge/trench collision.

Downhole Measurements and Logging

To fully characterize the margin we will carry out a downhole logging program and several downhole experiments. The standard logging suite (seismic stratigraphy string, geochemistry string, formation microscanner) is will be run at each site. All logging times are budgeted to include use of the side-entry sub (SES). In addition, special downhole experiments are planned at some sites. These include the following:

1) A Vertical Seismic Profile (VSP) experiment to allow detailed seismic profile/drill-hole stratigraphic correlation at SC-3.

2) Analysis of *in situ* fluids encountered within the forearc, including a series of pressure-core-barrel samples at at least one site (SC-3).

3) Temperature logs collected with a high-temperature logging tool at sites SC-3, SC-4, and SC-5.

Operational Plan

JOIDES Resolution will leave Panama on 17 November 1991. The drilling area will be reached after a transit of 13 days. Five sites (SC-1, SC-2, SC-3, SC-5; see Table 1a) are included in the detailed operational plan below. A schedule for the operations is given in Table 2. The remaining planned sites (SC-6, SC-4, SC-7, SC-7', SC-8, SC-9, SC-9'; see Table 1b) will be drilled in descending order of priority if time is available after completition of the main program.

A survey for Sites SC-1, SC-2 and SC-3 will be carried out using the Global Positioning System (GPS). To help in exactly locating these three sites, Line 745 will be resurveyed using shipboard single-channel seismic equipment. After having dropped beacon(s), three holes will be drilled at Site SC-3. The Hole A will be drilled and cored as an APC/XPC hole to 400 mbsf. The WSTP tool will be deployed for downhole-temperature measurements and fluid sampling before, during, and after penetration of the Bottom Simulating Reflector (BSR). After plugging Hole A the vessel will be offset a short distance to spud and wash Hole B to 150 mbsf. During this operation several WSTP runs will be made, and several PCS (Pressure Core Sampler) cores will be taken. Next, Hole C will be washed to 400 mbsf and cored to 500 mbsf using an RCB bottom-hole assembly. After the bit is dropped and the hole conditioned, logging will begin with temperature measurements with the high-temperature tool, followed by the seismic-stratigraphy, geochemistry, and FMS tool strings. Finally, VSP experiments will be carried out.

Next, we shall move upslope to proposed Site SC-2. Again, three holes will be spudded in close vicinity to each other, following the strategy outlined for Site SC-3. Hole A will be APC/XCB cored to 600 mbsf. Hole B will be washed to 150 mbsf, with retrieval of several PCS cores and several WSTP runs. Hole C will be drilled with an RCB bottom-hole assembly, washed to 600 mbsf, and then cored to 900 mbsf. After the hole is conditioned, logging will be undertaken using the seismic-stratigraphy, geochemistry, and FMS tool strings.

After we move to proposed Site SC-1, three holes will be spudded in close vicinity to each other, again following the strategy outlined for Site SC-3. Hole A will be APC/XCB cored to 600 mbsf. In order to address gas-hydrate-related objectives, Hole B will be washed to 150 mbsf, with retrieval of several PCS cores and several WSTP runs. Hole C will be drilled with an RCB bottom-hole assembly, washed to 600 mbsf, and then cored to 1200 mbsf. After the hole is conditioned, logging will be undertaken using the seismic-stratigraphy, geochemistry, and FMS tool strings.

JOIDES Resolution will then transit to proposed Site SC-5. After a pre-site survey and dropping of the beacon, one hole will be APC/XCB cored, to 700 mbsf. In the section to be cored by APC (upper 150 mbsf), several WSTP runs will be attempted. After the bit is dropped and the hole is conditioned, logging will be started with the high-temperature temperature tool, followed by runs of the seismic-stratigraphy, geochemistry, and FMS tool strings.

Operations will be terminated when the drilling time for Leg 141 is exhausted, and *JOIDES Resolution* will steam for Valparaiso, Chile. We shall arrive there after a transit of 3 to 4 days on the morning of 13 January 1992.

Special Operations

Special operations are focused on achieving recovery of both solid and fluid materials necessary for quantitative analyses of gas hydrate and other interstitial-fluid geochemical systems at several sites. Interstitial fluids will be collected with the WSTP tool at sites SC-1 through SC-5. In addition, core samples will be collected with the pressure core sampler (PCS) at sites SC-1 through SC-3.

Safety Considerations

The Chile triple junction (CTJ) is an area of elevated geothermal gradients with sufficient sediment thicknesses to have thermogenic oil and gas present. Furthermore, the CTJ is a region of widespread occurrences of Bottom Simulating Reflectors (BSRs) indicating the likely presence of gas hydrates, perhaps overlying some quantity of free gas. Chile triple junction drilling will be the first occasion where the JOIDES Pollution Prevention and Safety Panel (PPSP) has approved drilling through BSRs.

All three sites along the CDP Line 745 transect in the collision zone (Sites SC-1, SC-2, and SC-3) are loci of BSRs and were relocated during PPSP review to avoid highs on BSRs and deeper, potentially trapping configurations. Furthermore, an order of drilling was specified by the PPSP so that the deepest, safest site would be drilled first and the shallowest and potentially most hazardous site last with the understanding that if free gas, in dangerous quantities, is encountered in an earlier- drilled site, drilling is to be suspended on this transect. The approved sites in their specified drilling order are, therefore as follows: SC-3, SC -2, and SC-1. Two additional sites, SC-4 and SC-5, more or less analogous to SC-3 near the toe of the landward-trench slope, were also approved.

Site SC-6 was approved on the offshore extension of the Taitao Ridge. This ridge is composed of ophiolitic material onshore, and its seismic and magnetic character offshore indicate that it is either ophiolitic or oceanic crust. This site received PPSP approval over a range of locations along CDP Line 762.

PPSP approved the following sites on Line 769 and specified their drilling order as follows:

1) SC-7.
2) SC-7'.
3) SC-9'.
4) SC-9 (This site is the only one on this transect with a BSR).
5) SC-8 (This site was moved by PPSP to get farther downdip on a wedge of sediments that possibly contain updip pinchouts. Updip pinchouts can still occur in the site's approved, structurally lower, location. The panel feels that at the new structurally lower location, this site is reasonably safe if drilled last, as specified).

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Table 1a. Summary Site Information, Leg 141

Site	Latitude Longitude	Water Depth	Penetration Sed.	Penetration Basement	Drilling (hrs.)	Logging (hrs.)	Total (days)
SC-1	45°51.0′S 75°41.3′W	1700	1150	50	291.0	44.0	14.0
SC-2	45°52.0′S 75°45.0′W	2200	900	0	239.5	40.0	11.6
SC-3	45°53.7′S 75°51.3′W	2850	450	50	167.5	65.0 [1]	9.7
SC-5	46°14.0′S 75°46.0′W	2475	700	0	138.0	44.0 [2]	7.6
				Totals:	**836.0**	**193.0**	**42.9**

[1] Logging time estimate includes time for VSP experiment and logging run with high-temperature logging tool.

[2] Logging time estimate includes time for logging run with high-temperature tool.

Table 1b. Contingency Sites

Site	Latitude Longitude	Water Depth	Penetration Sed.	Penetration Basement	Drilling (hrs.)	Logging (hrs.)	Total (days)
SC-6	46°31.0´S 75°49.0´W	1280	100	50	35.5	21.0	2.3
SC-4	46°08.4´S 75°48.2´W	2320	765	0	132.0	45.0 [1]	7.4
SC-7	47°29.5´S 75°44.0´W	1875	650	0	153.0	36.0	7.9
SC-7´	47°30.5´S 75°47.0´W	2100	1150	50			
SC-8	47°31.2´S 75°53.3´W	2250	1200	0			
SC-9	47°33.0´S 76°00.0´W	1200	400	0			
SC-9´	47°33.5´S 76°04.0´W	1725	550	0			

[1] Logging time estimate includes time for logging with high-temperature logging tool.

Table 2. Leg 141 Drilling Schedule

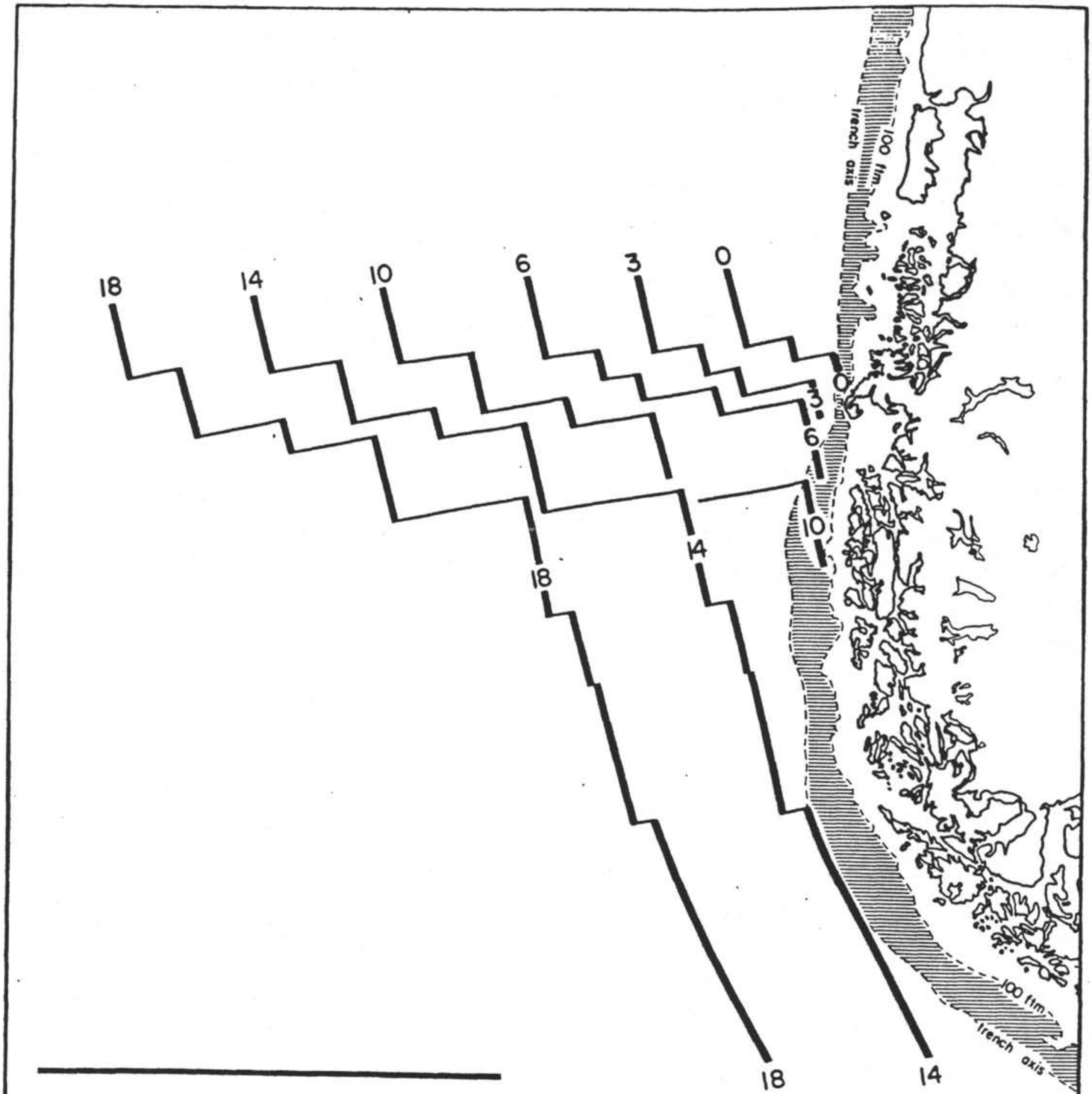
Leg 141 begins with port call in Panama on 12 November 1991, with a scheduled departure on 17 November 1991.

	Time on Site (days)	Transit Time (days)	Cumulative Time (days)
Transit from Panama to SC-3		13.1	
Arrive SC-3 30 November	9.7		22.8
Leave SC-3 09 December			
Arrive SC-2 09 December	11.6		
Leave SC-2 20 December			34.4
Arrive SC-1 20 December	14.0		
Leave SC-1 03 January			48.4
Arrive SC-5 03 January	7.6		
Leave SC-5 10 January			56.0
Transit from SC-6 to Valparaiso		3.4	
Totals:	**42.9**	**16.5**	**59.4**

Total days planned: 59.4
Total days available: 57.0

(Transit time assumes average speed of 10 kt.)

Leg 141 ends in Valparaiso, Chile on 13 January, 1992.



POSITION OF RIDGE CREST
RELATIVE TO SOUTH AMERICA
18 m.y. B.P. TO PRESENT

FIG. 1

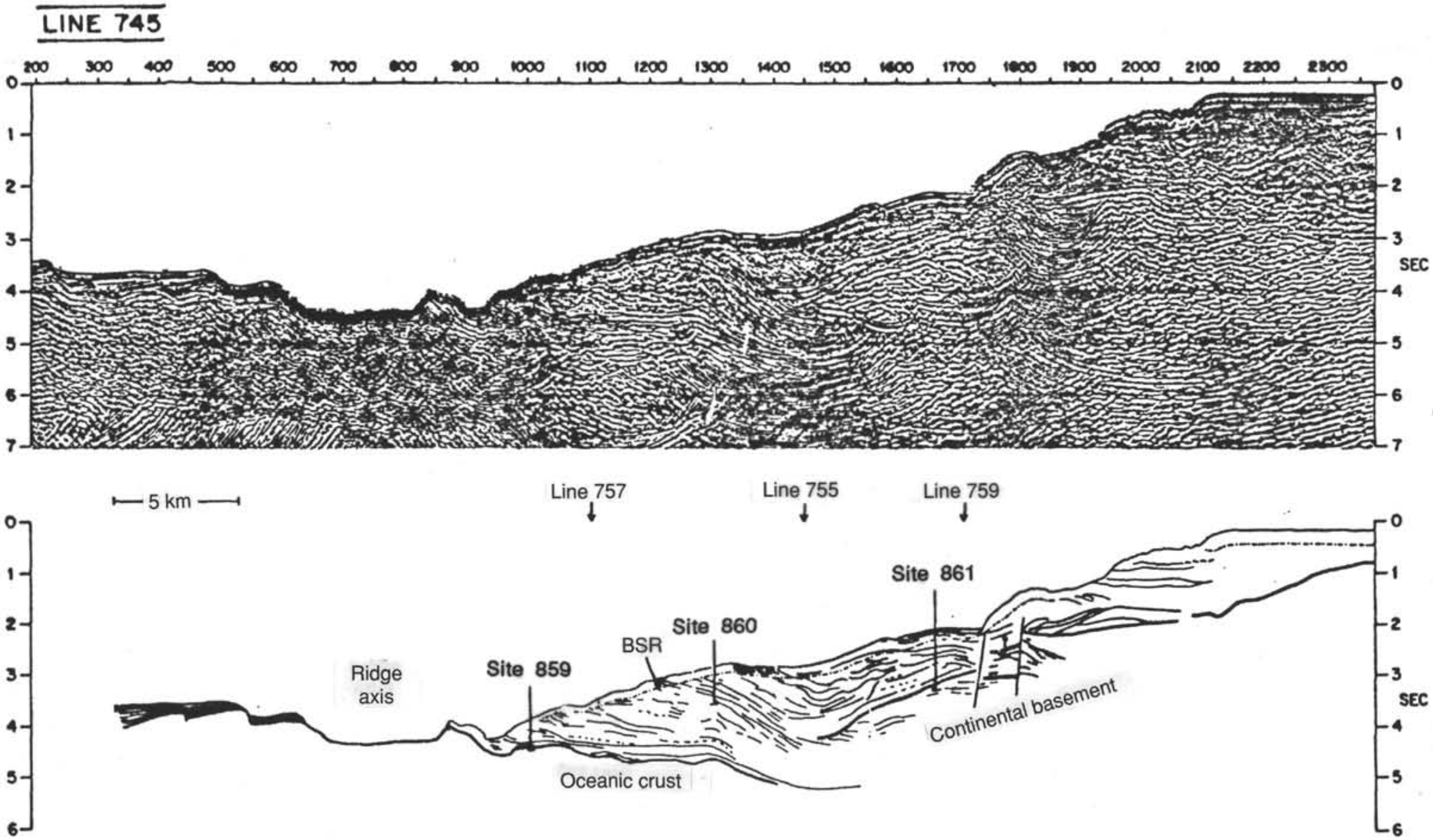


Figure 2. Line 745 regional cross section, including the proposed locations for sites SC-1 through SC-3.

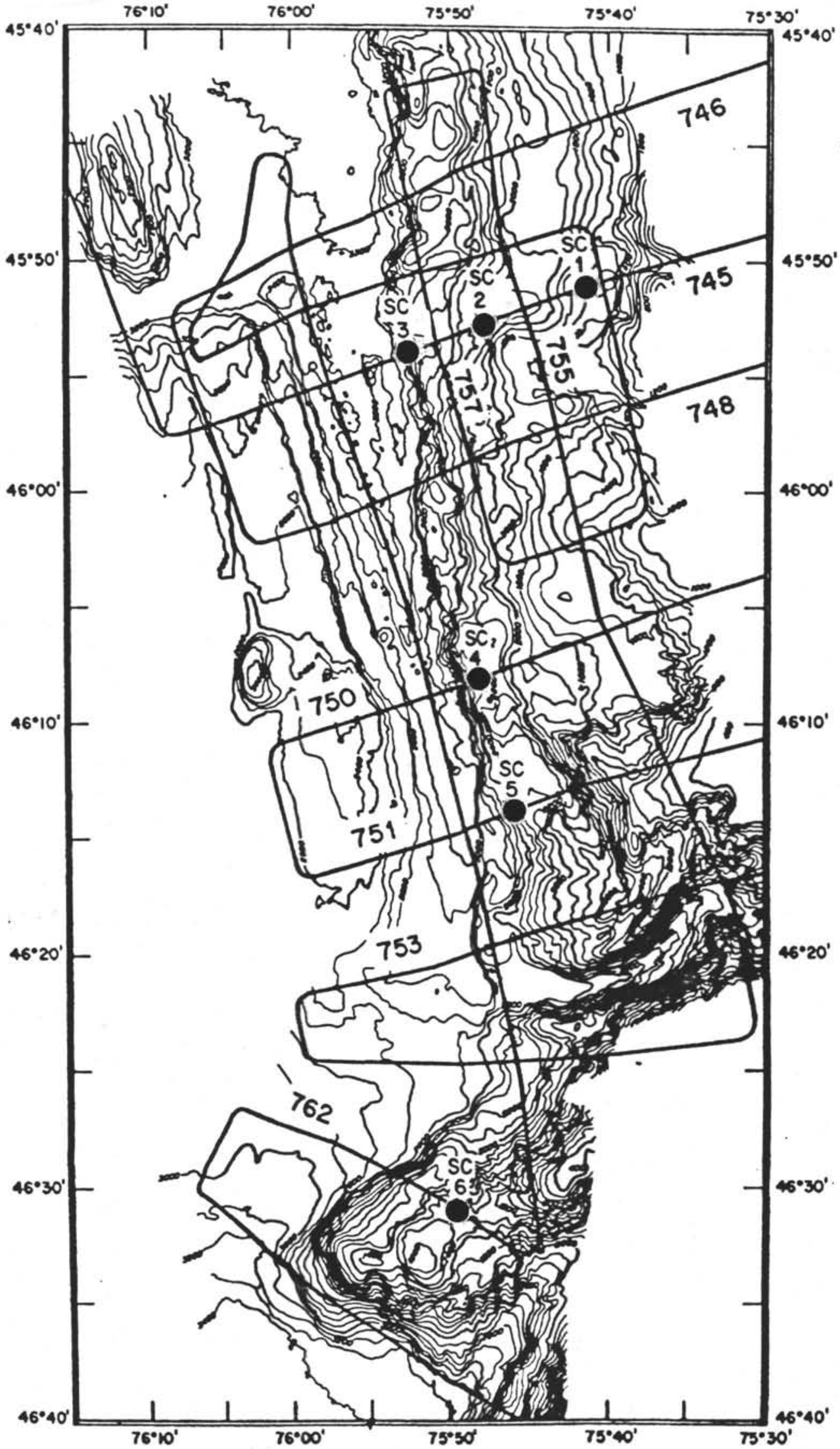


Figure 3. Locality map showing the main bathymetric features of the northern region of the Chile triple junction and proposed drill sites SC-1 through SC-6. Bathymetry in meters.

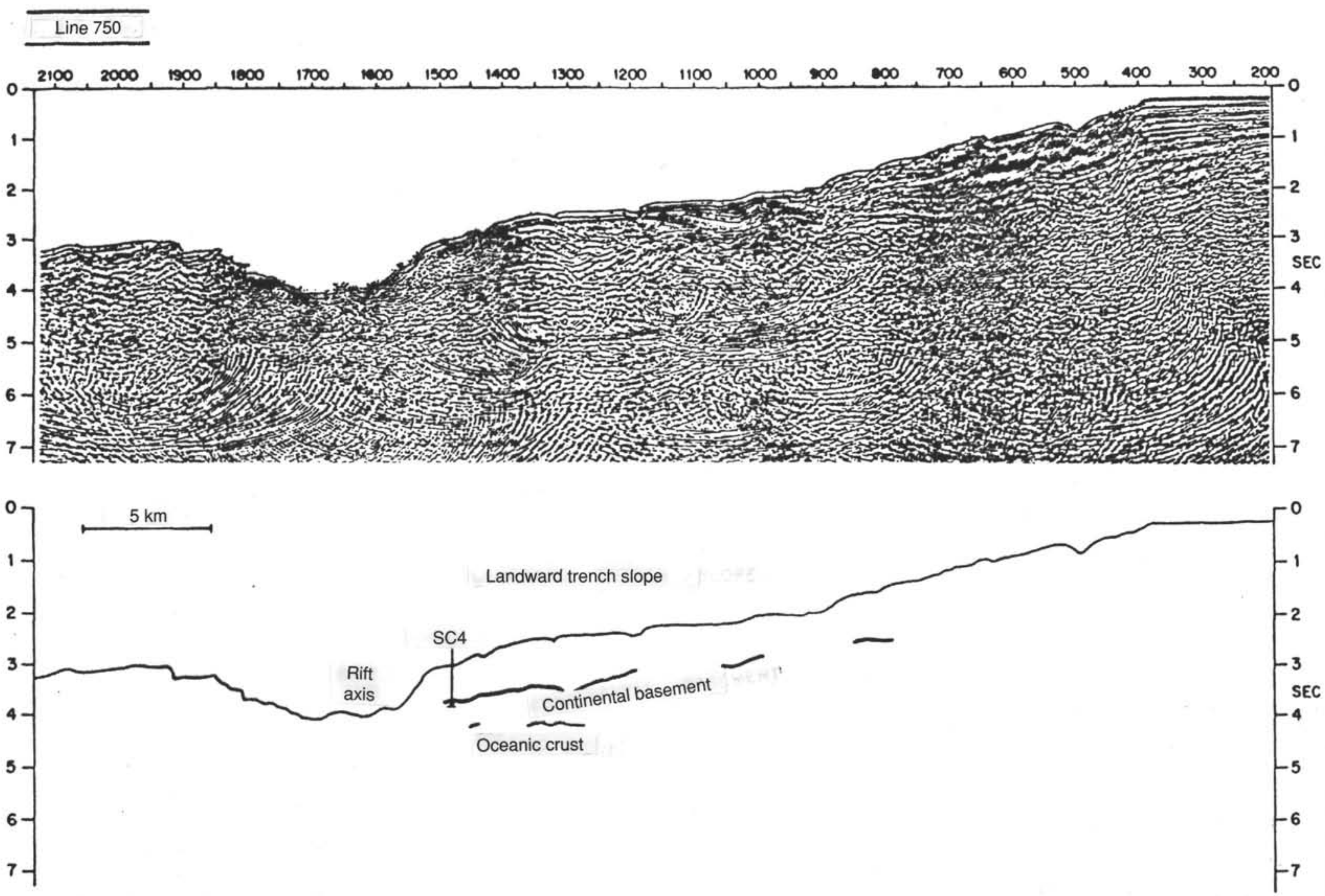


Figure 4. Line 750 regional cross section, including the proposed location for site SC-4.

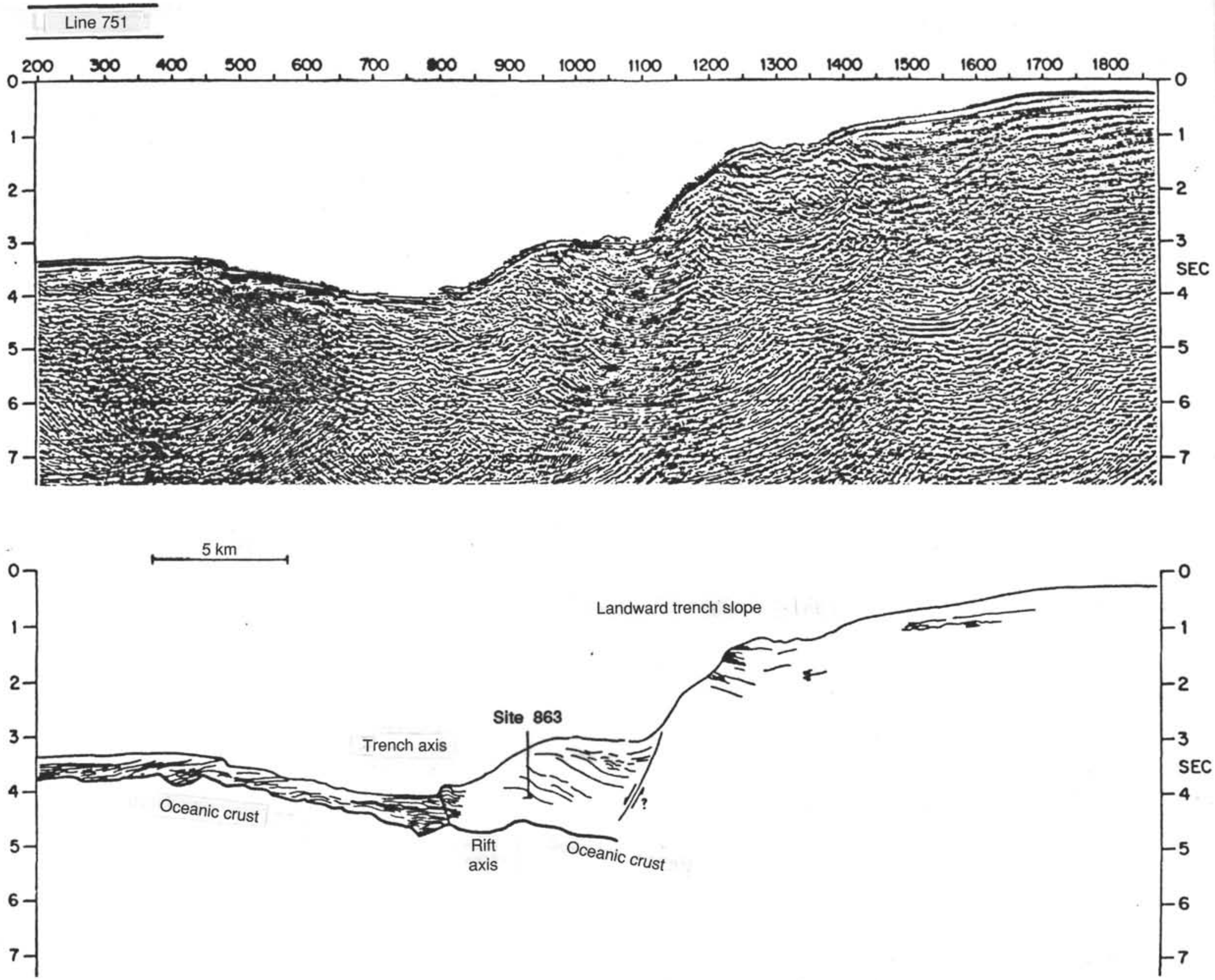


Figure 5. Line 751 regional cross section, including the proposed location for site SC-5.

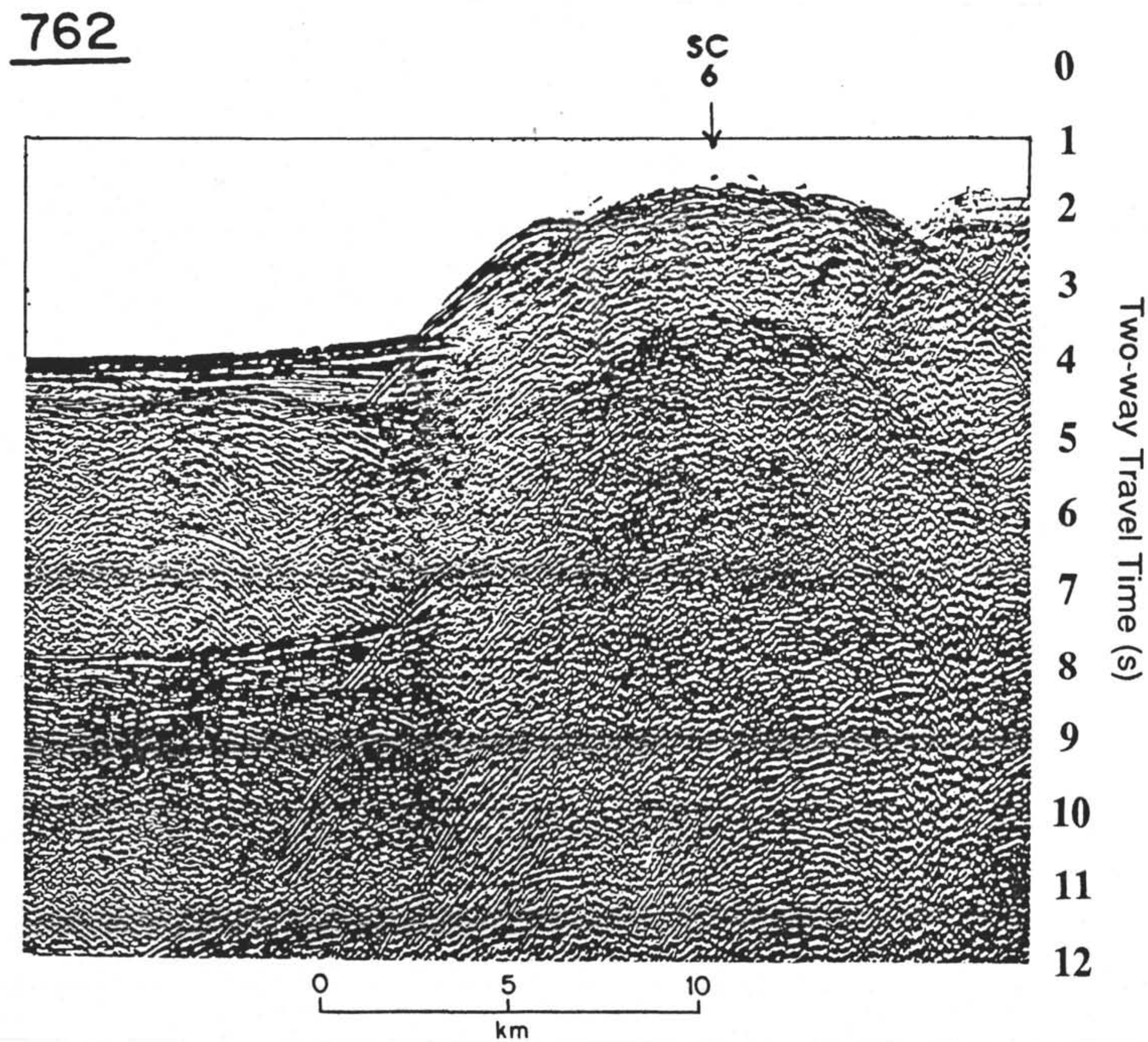


Figure 6. Line 762 detailed cross section, including proposed location for site SC-6.

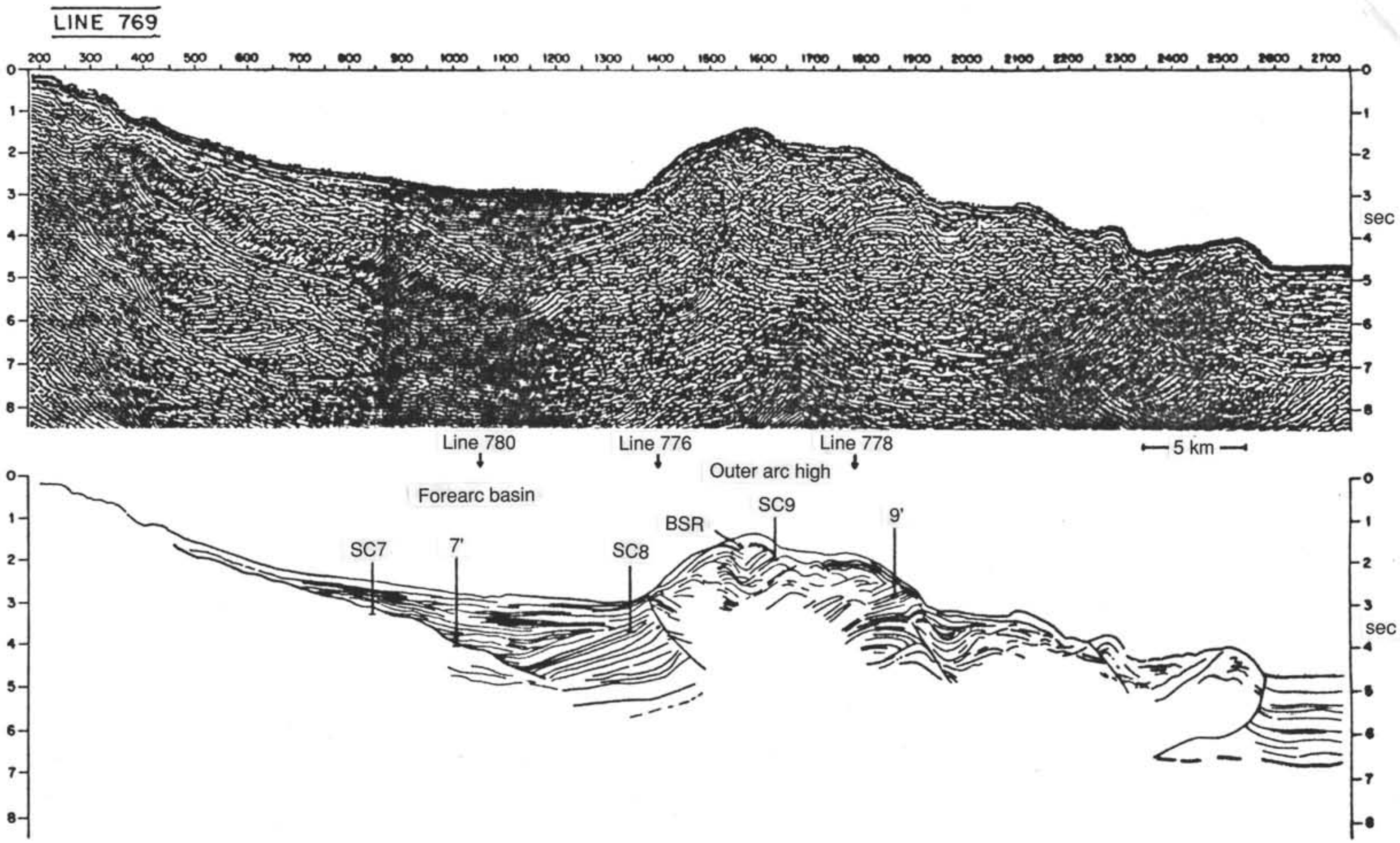


Figure 7. Line 769 regional cross section, including proposed locations for sites SC-7 through SC-9′.

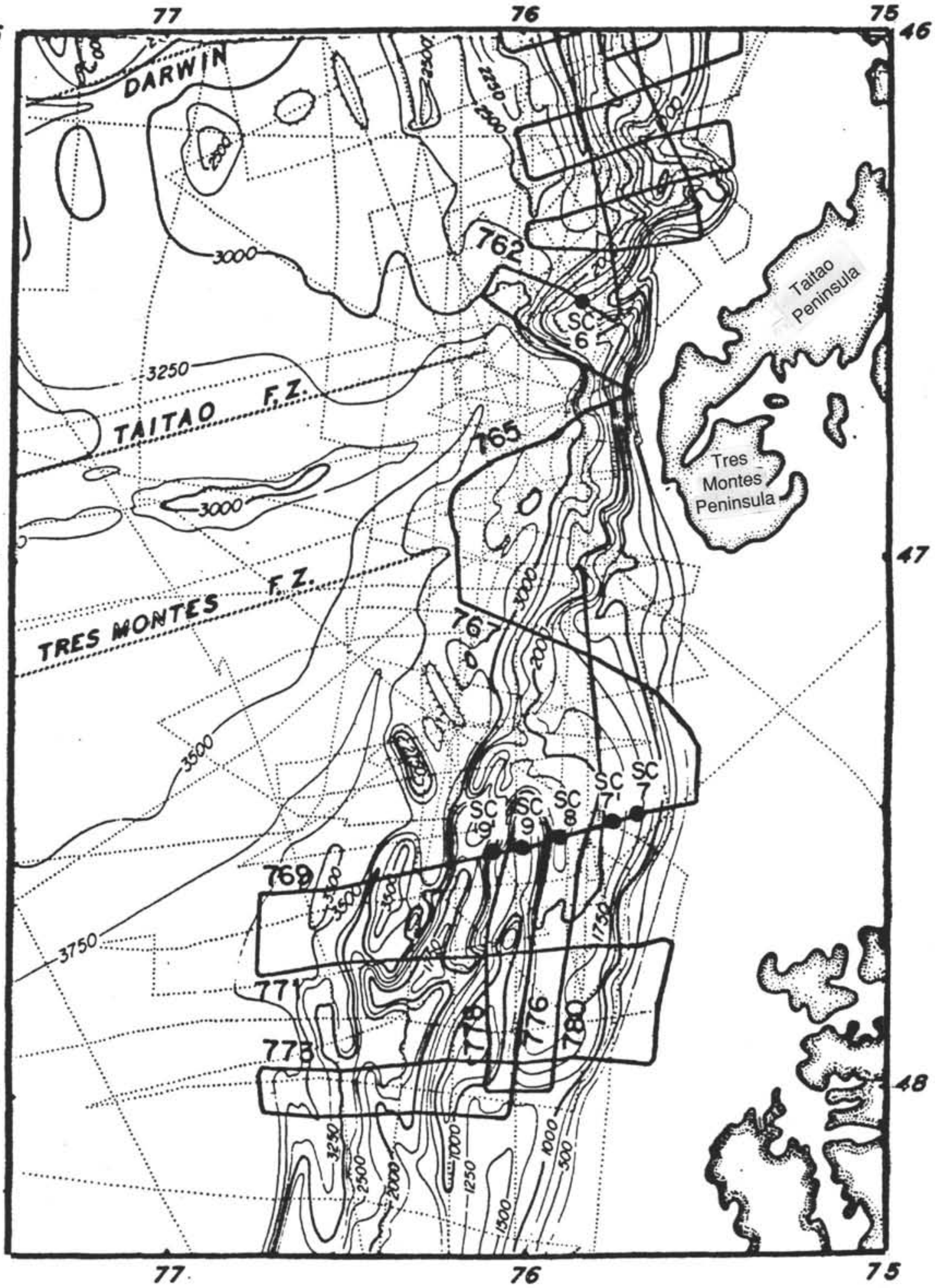


Figure 8. Locality map showing the main bathymetric features of the southern region of the Chile triple junction and proposed drill sites SC-6 through SC-9′. Bathymetry in meters.

PROPOSED DRILL SITE DESCRIPTIONS

Site: SC-1 Priority: 1

Position: 45°51.0′S, 75°41.3′W.

Water Depth: 1700 m.

Seismic Line: CDP 1620 on Line 745.

Objectives:

To determine the lithologies and depositional environments of the sediment sequences at the site, to determine the lithology of the regionally prominent low-frequency seismic reflector interpreted to be South American continental basement, and to determine the vertical-motion history of the continental basement at this site.

Tentative Drilling Program:

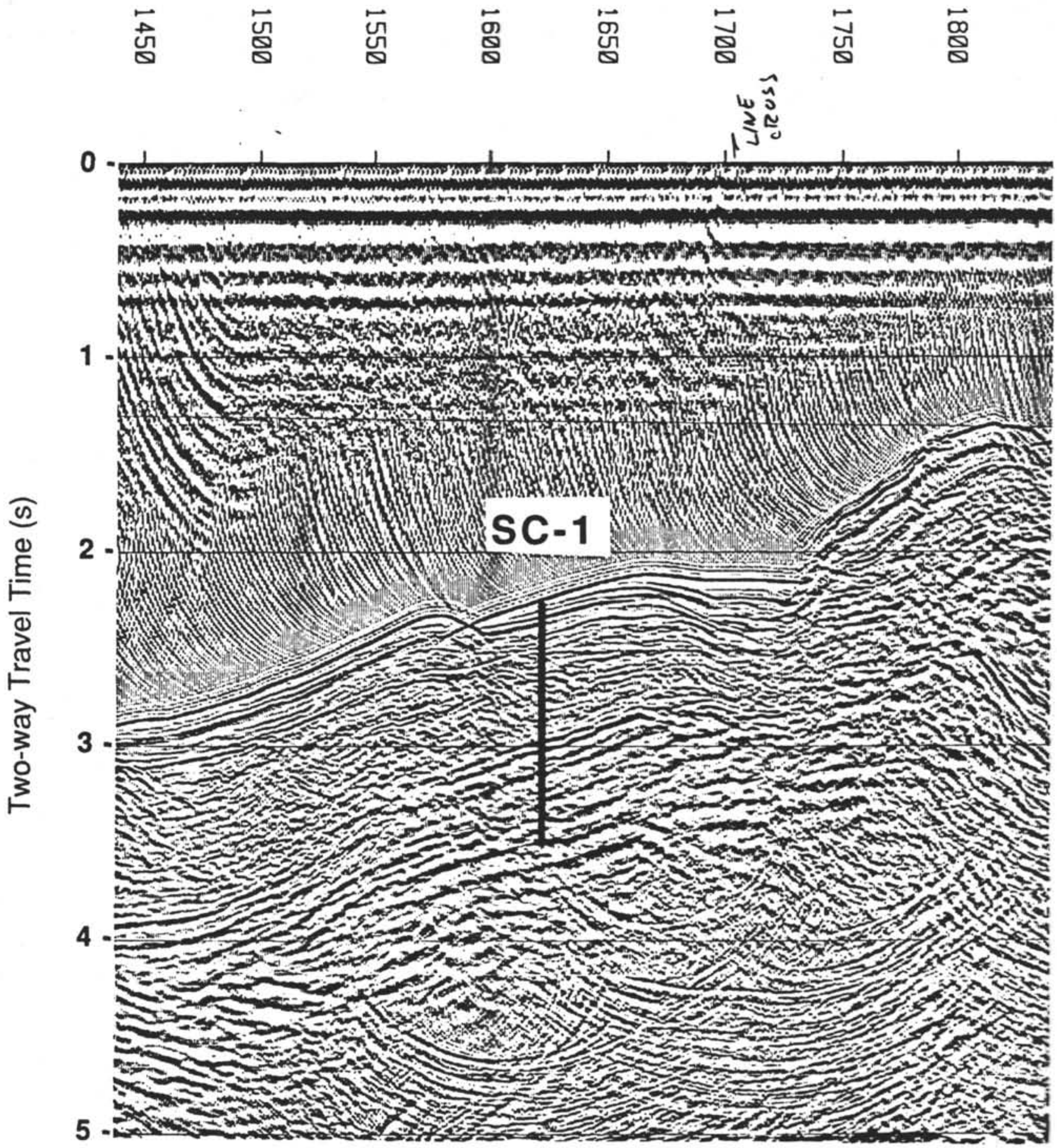
Hole A: APC to 150 mbsf, XCB to 600 mbsf.
Hole B: Wash to 150 mbsf, 4 PCS cores, 4 WSTP samples.
Hole C: Wash to 600 mbsf, RCB core to 1200 mbsf (50 m basement), condition hole and log.

Sediment Thickness: 1150 m, 50 m basement penetration.

Nature of Rock Anticipated: Shelf and upper continental slope clastic sediments of Holocene to Eocene age deposited on metamorphic basement of Cretaceous/Paleozoic age.

Formation Temperatures: 50-75°C at T.D.

Logging Operations: Standard logging suite.


1450
1500
1550
1600
1650
1700
1750
1800
SC-1
Two-way Travel Time (s)
0
1
2
3
4
5

Site: SC-2 Priority: 1

Position: 45°52.0'S, 75°45.0'W.

Water Depth: 2200 m.

Seismic Line: CDP 1375 on Line 745.

Objectives:

To determine the lithologies and depositional environments of the sediment sequences at the site, to determine the lithology of the regionally prominent low-frequency seismic reflector interpreted to be South American continental basement, and to determine the vertical-motion history of the continental basement at this site.

Tentative Drilling Program:

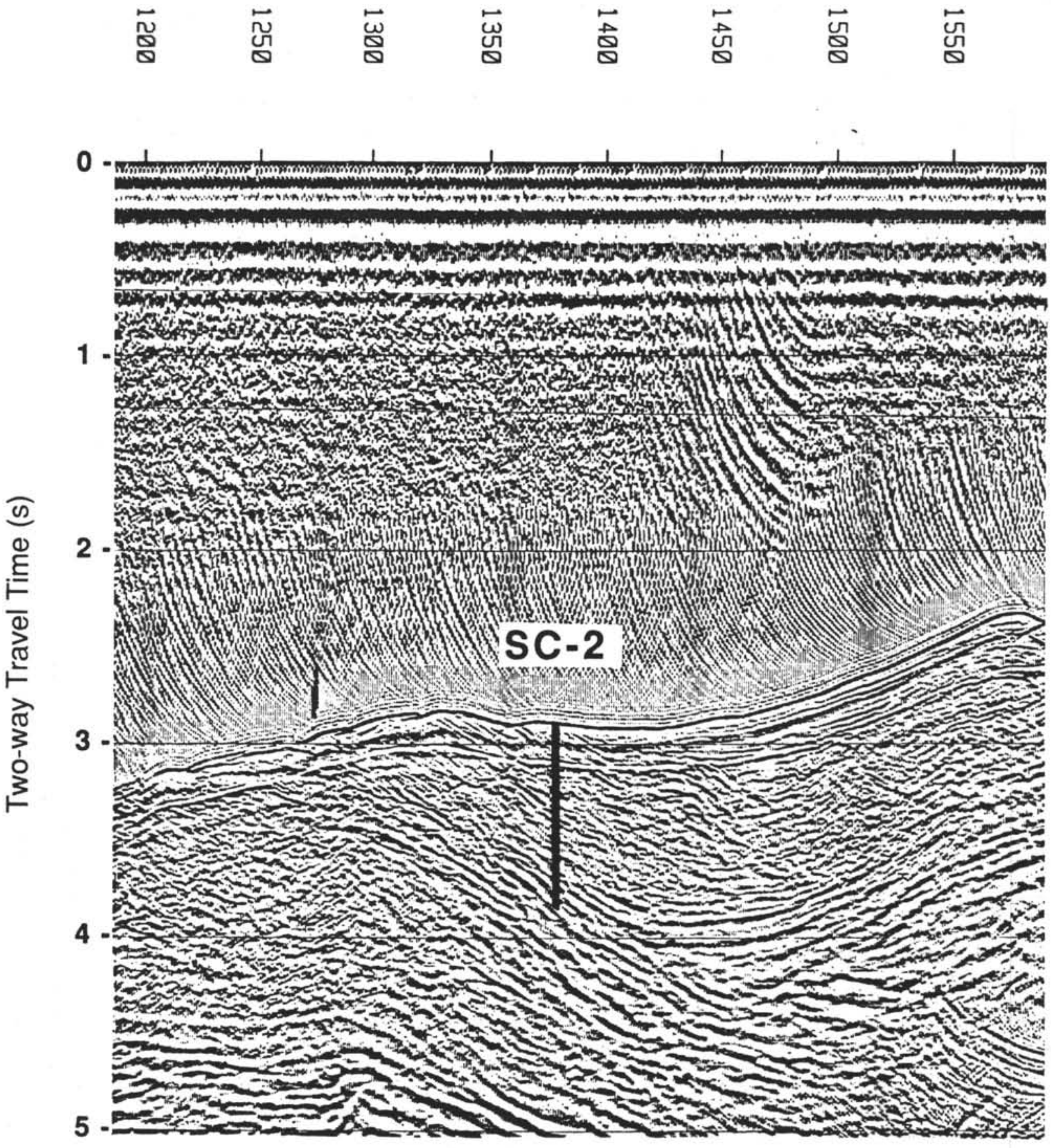
Hole A: APC to 150 mbsf, XCB to 600 mbsf.
Hole B: Wash to 150 mbsf, 4 PCS cores, 4 WSTP samples.
Hole C: Wash to 600 mbsf, core 600-900 mbsf, log.

Sediment Thickness: 900 m.

Nature of Rocks Anticipated: Shelf and upper continental slope clastic sediments of Holocene to Eocene age deposited on metamorphic basement of Cretaceous/Paleozoic age.

Formation Temperatures: 75-100°C at T.D.

Logging Operations: Standard logging suite.


1200
1250
1300
1350
1400
1450
1500
1550
0
1
2
3
4
5
Two-way Travel Time (s)
SC-2

Site SC-3 Priority: 1

Position: 45°53.7´S, 75°51.3´W.

Water Depth: 2850 m.

Seismic Line: CDP 1075 on Line 745.

Objectives:

To determine the lithologies and depositional environments of the sediment sequences at the site, to sample lithologic units that have been modified by hydrothermal circulation and near-trench volcanism, and to document structural fabrics and deformation caused by the close proximity to the rift axis. This site will also be the first to penetrate the BSR reflector and to sample sediments and fluids above, within, and below the BSR.

Tentative Drilling Program:

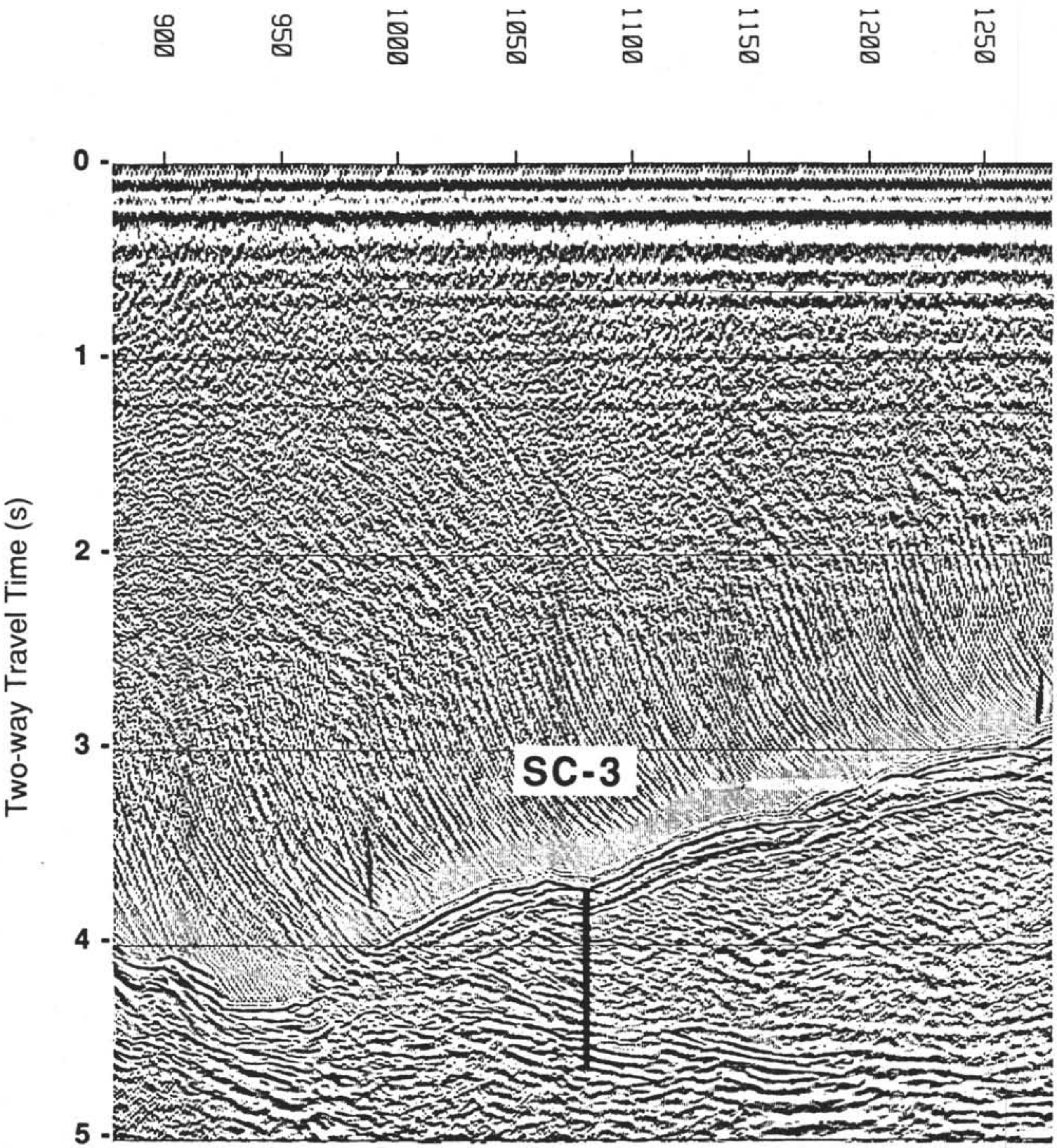
Hole A: APC to 150 mbsf, XCB to 400 mbsf.
Hole B: Wash to 150 mbsf, 4 PCS cores, 4 WSTP samples.
Hole C: Wash to 150 mbsf, core to 650 mbsf (50 m basement), log, VSP.

Sediment Thickness: 600 m, with 50 m basement penetration.

Nature of Rock Anticipated: Neogene to Holocene deformed sedimentary deposits, perhaps diagenetically altered by hydrothermal fluids.

Formation Temperatures: 150-200°C at T.D.

Logging Operations: Standard logging suite, plus single-component instrument VSP and high-temperature logging run.


900
950
1000
1050
1100
1150
1200
1250
Two-way Travel Time (s)
0
1
2
3
4
5
SC-3

Site SC-4 Priority: 1

Position: 46°08.4´S, 75°48.2´W.

Water Depth: 2250 m.

Seismic Line: CDP 1520 on Line 750.

Objectives:

To determine the lithologies and depositional environments of the sediment sequences at the site, and to sample lithologic units that have been modified by hydrothermal circulation and near-trench volcanism and to see structural fabrics and deformation caused by the close proximity to the rift axis.

Tentative Drilling Program:

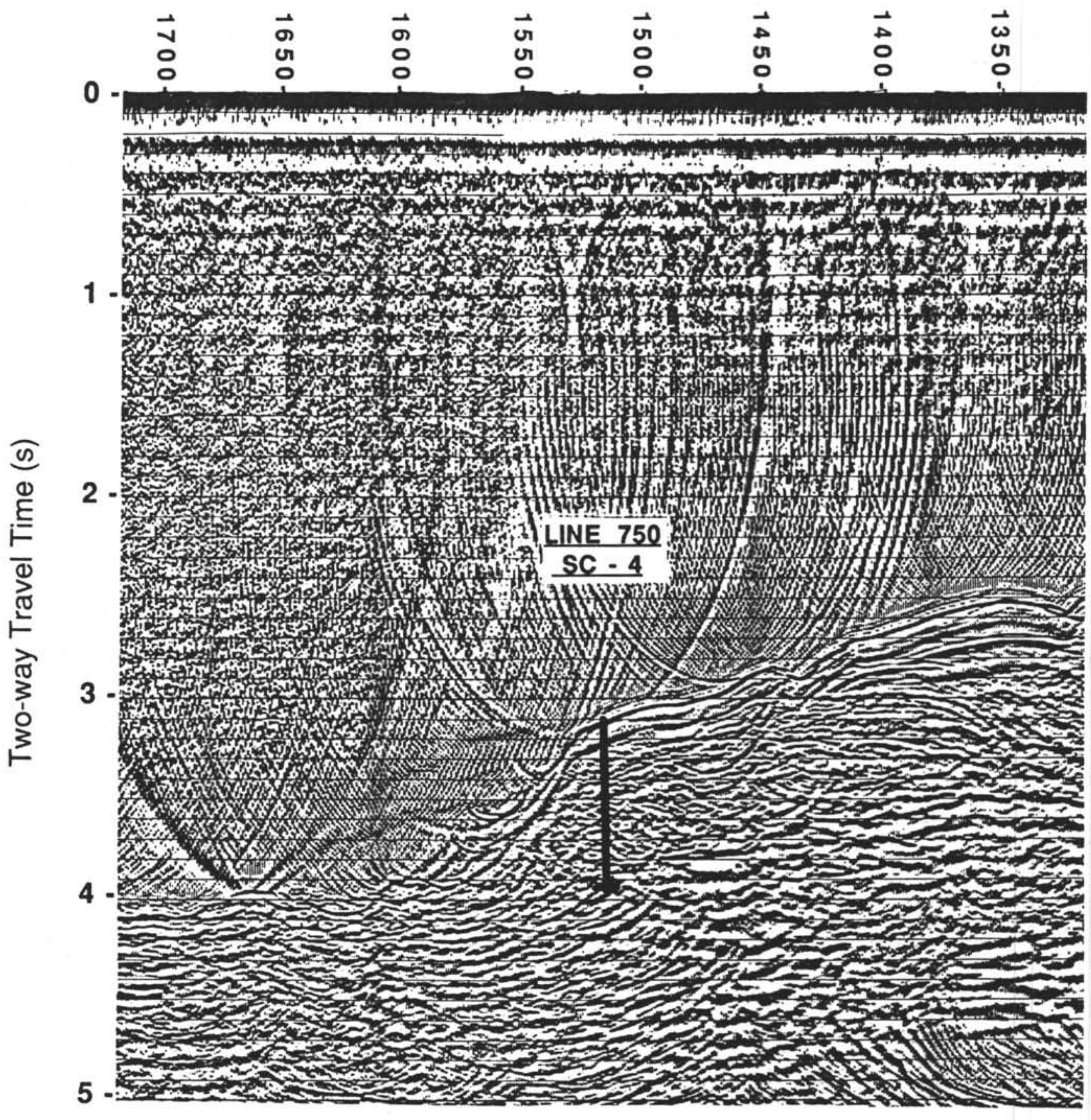
Hole A: APC to 150 mbsf, XCB to 600 mbsf, log.

Sediment Thickness: 765 m.

Nature of Rock Anticipated: Neogene to Holocene deformed sedimentary deposits, perhaps diagenetically altered by hydrothermal fluids.

Formation Temperatures: 150-200°C at T.D.

Logging Operations: Standard logging suite plus high-temperature logging run.


1700
1650
1600
1550
1500
1450
1400
1350
0
1
2
3
4
5
Two-way Travel Time (s)
LINE 750
SC - 4

Site SC-5 Priority: 1

Position: 46°14.0'S, 75°46.0'W.

Water Depth: 2475 m.

Seismic Line: CDP 900 on Line 751.

Objectives:

To determine the lithologies and depositional environments of the sediment sequences at the site, and to sample lithologic units that have been modified by hydrothermal circulation and near-trench volcanism and to see structural fabrics and deformation caused by the close proximity to the rift axis. This site is located directly over the subducted spreading axis.

Tentative Drilling Program:

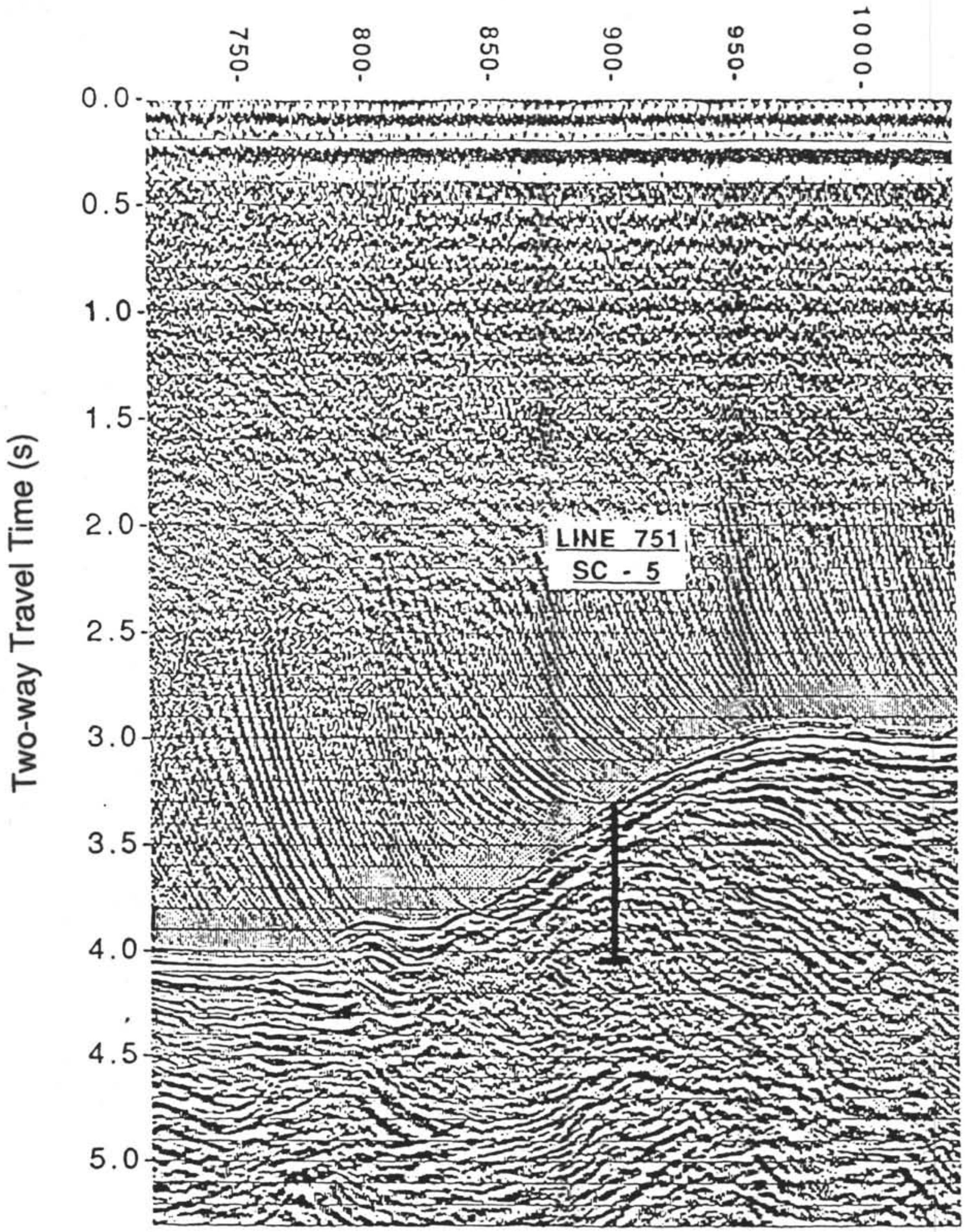
Hole A: APC to 150 mbsf, 4 PCS cores, 4 WSTP samples, XCB to T.D.

Sediment Thickness: 700 m.

Nature of Rock Anticipated: Neogene to Holocene deformed sedimentary deposits, perhaps diagenetically altered by hydrothermal fluids.

Formation Temperatures: 150-200°C at T.D.

Logging Operations: Standard logging suite plus high-temperature logging run.


750-
800-
850-
900-
950-
1000-
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Two-way Travel Time (s)
LINE 751
SC - 5

Site SC-6 Priority: 1

Position: ~46°31.0'S, 75°49.0'W.

Water Depth: 1280-1500 m.

Seismic Line: Range from CDP 350-600 on Line 762.

Objectives:

Determine the basement lithology of the Taitao Ridge and its relationship to the Taitao ophiolite on land to the east.

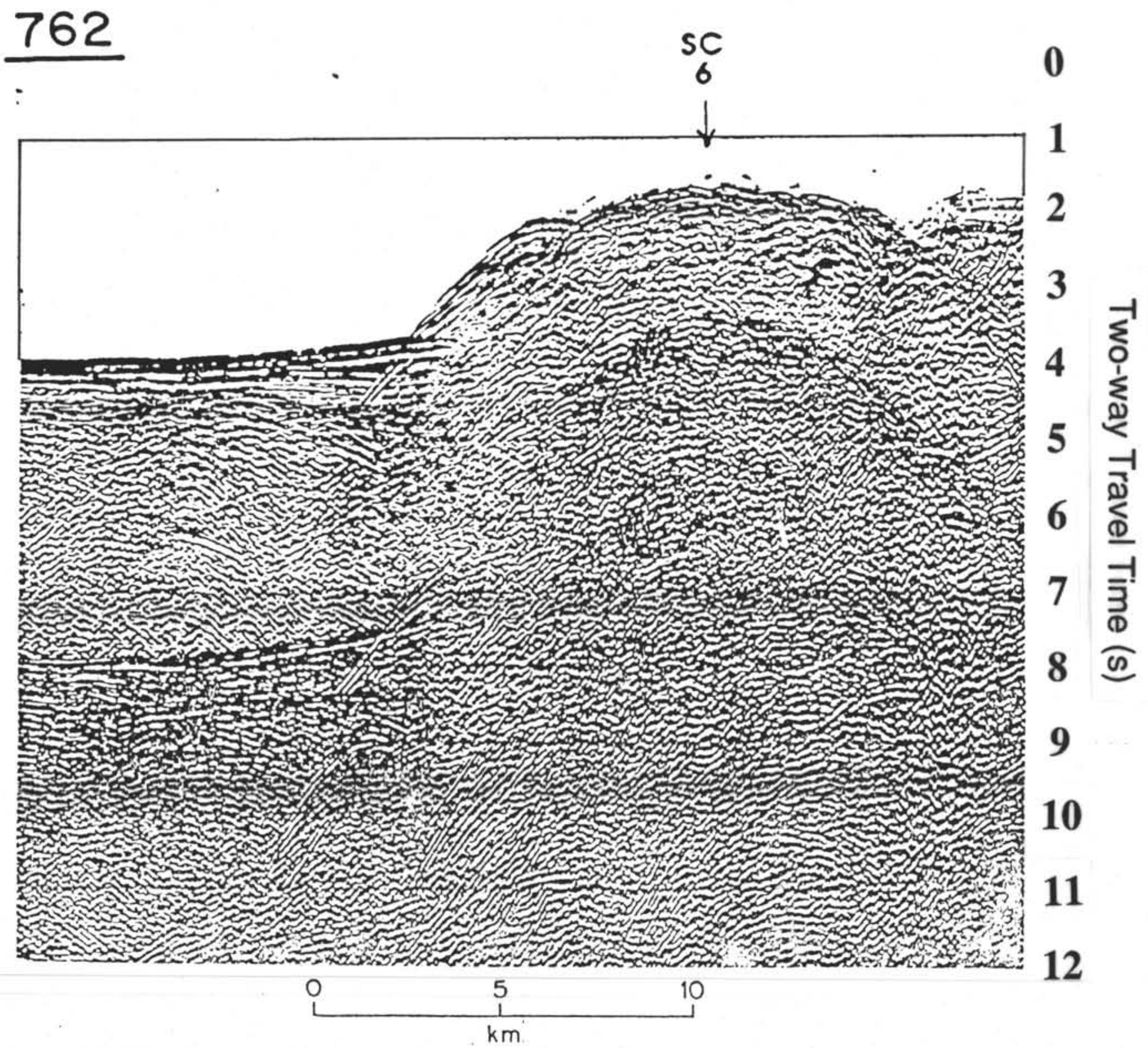
Tentative Drilling Program:

Hole A: RCB to 150 mbsf, log.

Sediment Thickness: Approximately 100 m.

Nature of Rock Anticipated: Neogene sediment overlying igneous oceanic crust.

Logging Operations: Standard logging suite.


762
SC
6
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4
5
6
7
8
9
10
11
12
Two-way Travel Time (s)
0
5
10
km

Site SC-7 Priority: 1

Position: 47°29.5´S, 75°44.0´W.

Water Depth: 1875 m.

Seismic Line: CDP 830 on Line 769.

Objectives:

Determination of the age and depositional environment of the younger of two sedimentary sequences that form the forearc basin at this location, where the triple junction passed about 3 my ago. Identification of the seismic reflector that is interpreted to be ancient continental basement.

Tentative Drilling Program:

Hole A: APC to 150 mbsf, XCB to 500 mbsf, 4 WSTP samples.
Hole B: Wash to 500 mbsf, RCB to 650 mbsf (50 m basement), log.

Sediment Thickness: T.D. 650 m.

Nature of Rock Anticipated: Neogene to Holocene clastic sediments overlying metamorphic continental basement.

Logging Operations: Standard logging suite.

Site SC-7' Priority: 1

Position: 47°30.5´S, 75°47.0´W.

Water Depth: 2100 m.

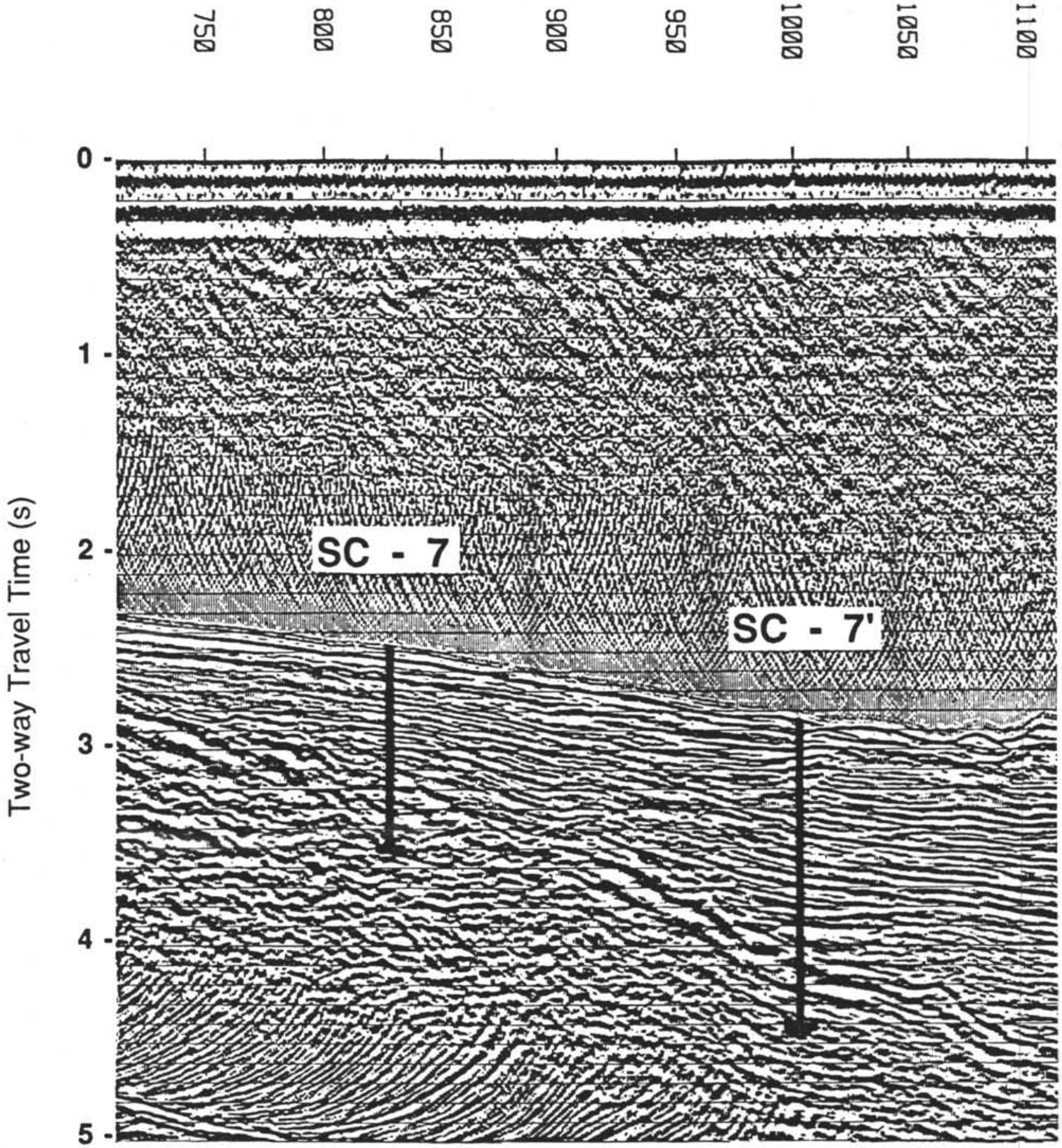
Seismic Line: CDP 1000 on Line 769.

Objectives:

Same as at SC-7 objectives, but this site will sample a deeper and more complete section of the sedimentary fill of the forearc basin.

Sediment Thickness: T.D. 1150 m.

Nature of Rock Anticipated: Neogene to Holocene clastic sediments overlying metamorphic continental basement.


750
800
850
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950
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1050
1100
0
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2
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Two-way Travel Time (s)
SC - 7
SC - 7'

Site SC-8 Priority: 1

Position: 47°31.2′S, 75°53.3′W.

Water Depth: 2250 m.

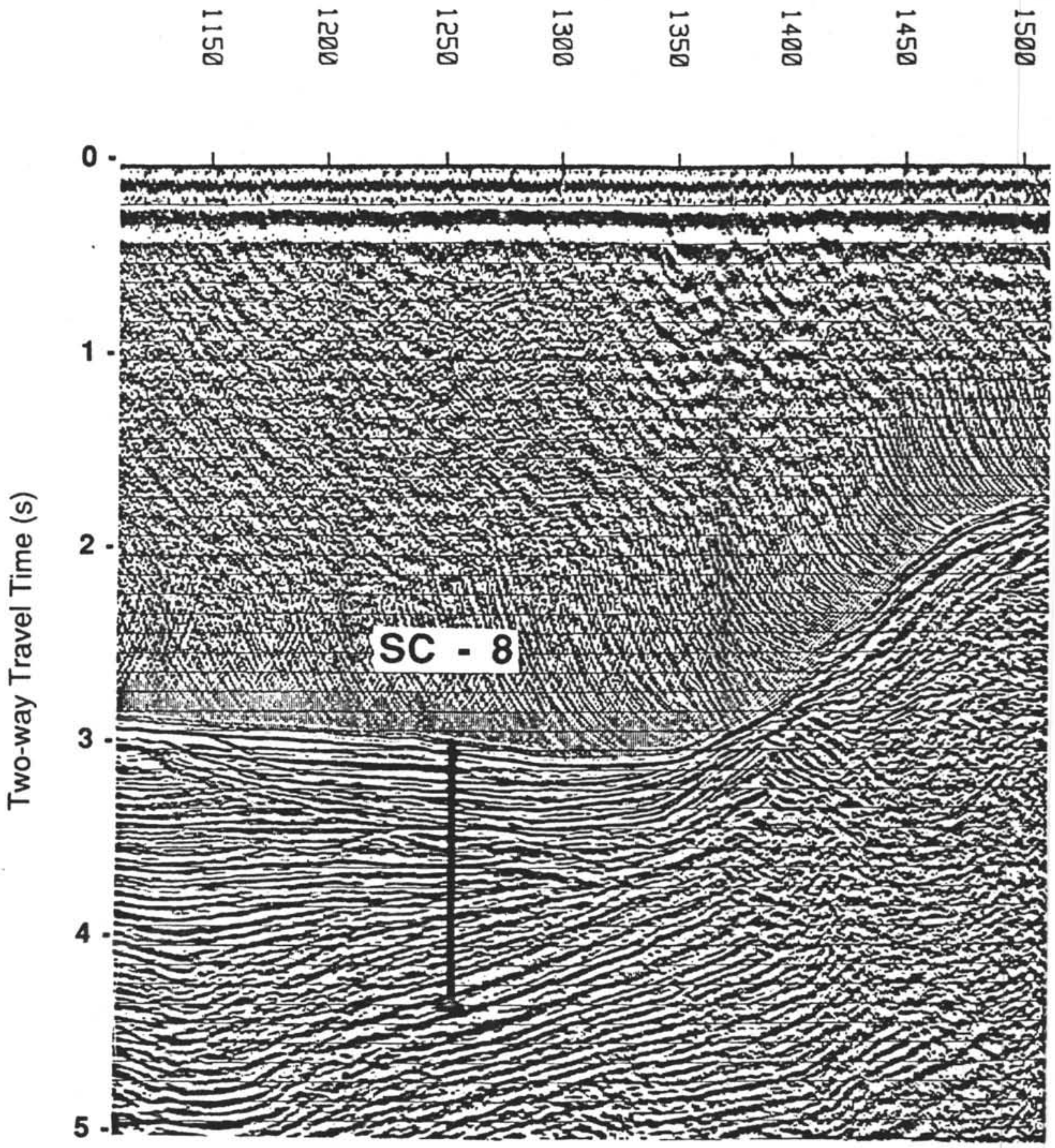
Seismic Line: CDP 1250 on Line 769.

Objectives:

Determine the age and environment of deposition of the older of the two forearc sedimentary sequences. Date the angular unconformity that separates these two sequences with respect to the timing of ridge/crest collision at this location along the margin.

Sediment Thickness: T.D. 1200 m.

Nature of Rock Anticipated: Paleogene(?) to Holocene clastic sedimentary rocks.


1150
1200
1250
1300
1350
1400
1450
1500
0
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4
5
Two-way Travel Time (s)
SC - 8

Site SC-9 Priority: 1

Position: 47°33.0'S, 76°00.0'W.

Water Depth: 1200 m.

Seismic Line: CDP 1630 on Line 769.

Objectives:

Determine the age and lithology of the material that composes the accretionary complex at this location along the margin.

Sediment Thickness: T.D. 400 m.

Nature of Rock Anticipated: Neogene(?) deformed sedimentary rocks.

Site SC-9' Priority: 1

Position: 47°33.5'S, 76°04.0'W.

Water Depth: 1725 m.

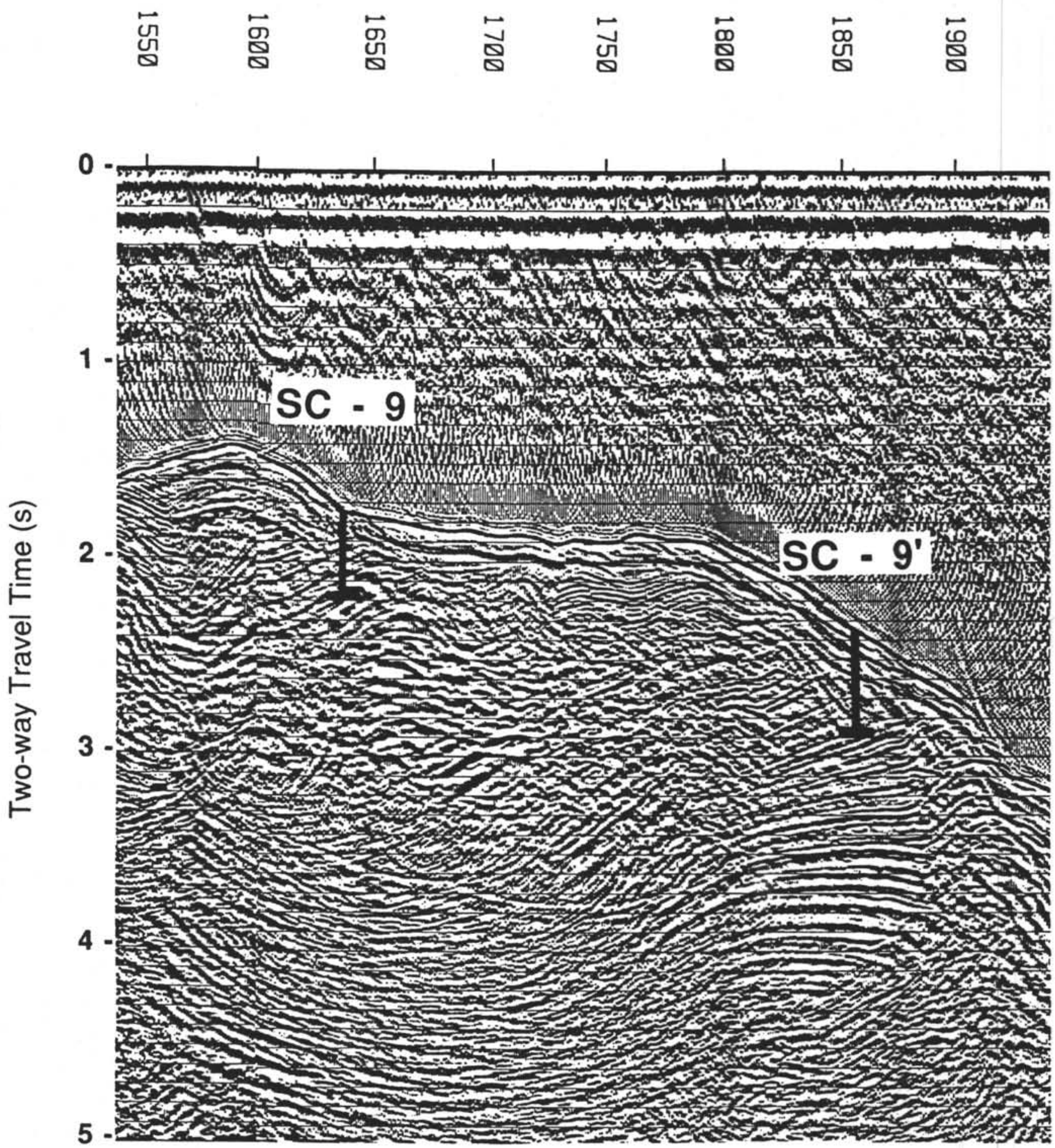
Seismic Line: CDP 1855 on Line 769.

Objectives:

Determine the age and lithology of the material that composes the accretionary complex at this location along the margin.

Sediment Thickness: T.D. 550 m.

Nature of Rock Anticipated: Neogene(?) deformed sedimentary rocks.


1550
1600
1650
1700
1750
1800
1850
1900
0
1
2
3
4
5
Two-way Travel Time (s)
SC - 9
SC - 9'

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Ocean Drilling Program Leg 141

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Chilean Scientist:	TO BE NAMED
Chilean Scientist:	TO BE NAMED
Chilean Observer:	TO BE NAMED
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