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# REPORT FOR AIR-GUN DATA ACQUIRED AT ONSHORE STATIONS DURING THE 1994 LOS ANGELES REGION SEISMIC EXPERIMENT (LARSE), CALIFORNIA

By

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## ABSTRACT

This report describes the acquisition and reduction of deep-crustal onshore-offshore seismic refraction/wide-angle reflection data in the Inner California Borderland-Los Angeles metropolitan region, conducted in October 1994 as part of the Los Angeles Regional Seismic Experiment (LARSE). LARSE is a cooperative study of the crustal structure of southern California involving earth scientists from the U.S. Geological Survey (USGS), California Institute of Technology (Caltech), the University of Southern California (USC), the University of California Los Angeles (UCLA), and other institutions of the Southern California Earthquake Center (SCEC). During LARSE, the R/V *Ewing*'s 20-element air gun array, totaling 137.7 liters (8470 cu. in.), was primarily used as a seismic source for wide-angle recording along three main onshore-offshore lines centered on the Los Angeles basin and the epicenters of the 1933 Long Beach and 1994 Northridge earthquakes. The LARSE onshore-offshore lines were each 200-250 km long, with the offshore source lines being between 90 and 150 km long. The 22,128 air gun signals generated by the *Ewing* were recorded by an array of 174 PASSCAL Reftek recorders deployed at 2 km intervals along all three of the onshore lines and 9 ocean bottom seismometers (OBSs) deployed along two of the lines. The *Ewing*'s 4.2-km, 160-channel, digital streamer was also used to record approximately 1250 km of 40-fold multichannel seismic-reflection data.

To enhance the fold of the wide-angle data recorded onshore, mitigating against cultural and wind noise in the Los Angeles basin, the entire ship track was repeated at least once resulting in fewer than about 660 km of unique trackline coverage in the Inner Borderland. Portions of the seismic-reflection lines were repeated up to 6 times. The marine air-gun signals were recorded by portable land recorders which were deployed in continuous recording mode. With the use of accurate GPS timing at both sources and receivers, seismograms were extracted from the continuously recorded data. In this report, we describe the equipment and procedures used to acquire the onshore-offshore seismic refraction/wide angle reflection data, discuss the reduction of the data, and present reduced travel-time seismic sections of the acquired common-station-gather profiles. A more complete description of the marine seismic data collected by the *Ewing* is available in Brocher et al. (1995) and ten Brink et al. (1996). A third portion of the full LARSE experiment involved onland explosive sources collected by onland portable recorders which is described in Murphy et al. (1996). Local earthquakes which occurred during the acquisition of the air-gun data are described in Okaya et al. (1996). A separate LARSE experiment in 1993 to collect earthquakes over a several week period along Line 1 is described in Kohler et al. (1996).

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## FIGURES AND APPENDIX

# INTRODUCTION

The seismic earthquake hazards posed by blind thrust faults in southern California have been reported by a number of investigators (Stein and King, 1984; Stein and Yeats, 1989; Wright, 1991; Crouch and Suppe, 1993; Davis and Namson, 1994; Shaw and Suppe, 1994; Shaw et al., 1994). Crustal seismic reflection and refraction/wide angle reflection methods are valuable and necessary tools for imaging the structural framework associated with blind thrusts, and can provide constraints for large-scale balanced crustal cross sections used to map thrust ramps in the subsurface. Both the damaging 1971 $M_L$ 6.4 San Fernando and 1994 M 6.7 Northridge earthquakes occurred on blind thrusts (U.S. Geological Survey and the Southern California Earthquake Center, 1994). The damaging 1987 M 5.9 Whittier Narrows earthquake (Hauksson et al., 1988) was also on a blind thrust fault.

This report describes the collection of refraction/wide-angle reflection (R/WAR) profiles in the metropolitan Los Angeles region as part of the Los Angeles Regional Seismic Experiment (LARSE). LARSE is a cooperative study of the crustal structure of southern California involving scientists from the U.S. Geological Survey (USGS), California Institute of Technology (Caltech), the University of Southern California (USC), the University of California Los Angeles (UCLA), and other institutions of the Southern California Earthquake Center (SCEC). Seismic refraction/ wide-angle reflection profiling in the greater Los Angeles area, conducted during 13-21 October, 1994, used the R/V *Ewing*'s 137.7 liter (8470 cu. in) air gun array and onland IRIS/ PASSCAL portable seismic recorders. The R/V *Ewing* fired 22,128 air gun shots into 174 land-based stations which were subdivided into three major land arrays ( Lines 1-3, Fig. 1a) during the LARSE work.

At the heart of LARSE was the collection of three long onshore-offshore transects involving sources along marine Lines 1 to 3 which provided air gun signals for land recorders deployed as inline land arrays (Figure 1A). R/WAR Line 1 involved marine sources trending NNE-SSW from the center of San Clemente Island through Seal Beach, the Los Angeles basin, San Gabriel Mts., and the Mojave Desert, passing near the epicenters of the 1933 M 6.3 Long

Beach, 1987 M 5.9 Whittier Narrows, and 1991 M 5.8 Sierra Madre earthquakes. Line 2 involved sources trending N-S along the western shores of San Clemente and Santa Catalina Islands through the Santa Monica Mts., west San Fernando Valley, San Gabriel Mts, and the Mojave Desert, passing through the 1994 Northridge earthquake epicenter. Marine sources for Line 3 trending ENE-WSW from northwest of San Nicolas Island crossed the center of Los Angeles basin (Wright, 1991). These three major R/WAR lines provide a regional reconnaissance of the crustal structure centered on the Los Angeles basin; in addition they provide specific information about the crustal structure in the vicinity of four recent, damaging earthquakes in the greater Los Angeles region. Special care was taken to acquire large segments of these lines late at night (2300 L to 0500 L) (all local times given herein are Pacific Standard Time), causing us to repeat parts of Lines 1 and 2 up to 5 times (Figures 2A and 2B). The planned ship track was altered throughout the cruise in order to maximize the acquisition of onshore-offshore data during late-night hours.

Line 1 (Fig. 1a). was the major focus of LARSE, extending through Seal Beach, the Whittier (Puente) Hills, San Gabriel River Canyon, Mescal Creek, El Mirage Lake, and Harper's Lake. Line 2 extended from Malibu through the western San Fernando Valley (1994 Northridge earthquake epicenter) into the western Antelope Valley of the Mojave desert. Line 3 extended from El Segundo to Redlands as an east-west cross line to the other transects. All three land arrays required a total of 174 stations. Portable instruments capable of recording continuously were deployed at the stations. Vertical component (4-1/2 Hz) sensors were attached to the portable instruments. The stations were operated and maintained for seven days, requiring two sets of service runs. Data were retrieved at the end of the acquisition period by returning the instruments to the instrument center based in Glendora, California where the data were downloaded to archive 8-mm cartridge tape. Data reduction was conducted at USC and at Caltech after the completion of the field experiment.

The R/V *Ewing* acquired at the same time several deep-crustal seismic-reflection profiles on the continental shelf of the Inner California Borderland, in the vicinity of Los Angeles, stretching from the 32°38'N to 34°N and from 119°45'W to 117°40'W (Figure 1b). A more

complete description of the marine acquisition is available in Brocher et al. (1995) and ten Brink et al. (1996)

## DATA ACQUISITION

The track of the R/V of *Ewing* is subdivided into sixteen ship-track lines (Table A). The ship tracks involved multiple passes along the three lines (Table B). Differing numbers of air-gun shots and line lengths characterize these ship tracks (Brocher et al., 1995) All air-gun shots were recorded by the land-based portable recorders.

### Instrumentation on the R/V *Ewing* for Sources

Multichannel seismic-reflection profiling on the *Ewing* was performed using a 20-element, 137.7 liter (8470 cu. in.) air-gun array and a 160-channel, 4.2-km-long digital Digicon streamer. The air-gun array, composed of Bolt air guns, was generally towed at depths between 8 and 10 meters. The sizes of the air-gun chambers varied from 145 cu. in. (2.4 liters) to 875 cu. in. (14.2 liters) to provide a tuned outgoing source wavelet (Brocher et al., 1995).

Air-gun shot times recorded in the navigation files were from the air-gun fire command time determined from a Magnavox GPS clock. The Magnavox Global Positioning Satellite (GPS) receiver for the ship was located above the ship's bridge about 47.8 m forward of the stern of the ship, roughly 87.4 m forward of the center of the air gun array. Given jitter in the air-gun firing times (less than a millisecond), these shot times are considered accurate to within a millisecond. The air guns were generally fired during turns to permit the onshore recording of the air-gun signals; air guns were shut off only when turning within the 3-mile California State limit.

Navigation on the *Ewing* was based on redundant Magnavox GPS receivers operated in selected availability mode: the GPS locations were smoothed over a ten-minute window and updated using the Furuno course and speed log. This navigation was written to a separate 3480 cartridge tape and is estimated to be accurate to within 25 meters.

Files containing air-gun origin times and final air-gun locations were sent from the *Ewing* via e-mail to all LARSE investigators on a daily basis (Table C). These origin times were used to examine the quality of data recorded onshore by the three deployments of Refteks. The reduction and playback of wide-angle data during the field experiment were instrumental in the decision to repeat Line 1 numerous times to insure that this line was recorded during late-night hours when onshore noise conditions were lower within the Los Angeles basin. Communications with both land- and shore-based LARSE personnel was generally achieved using cellular phones.

### Lines 1-3

Line 1, between Seal Beach and the northern Mojave Desert, had 86 land stations including two stations each on Santa Catalina and San Clemente Islands. Line 2, between Malibu and the western Antelope Valley, had 47 stations, and Line 3, east-west through the Los Angeles basin, had 41 stations (Fig. 1a). Location coordinates with ±10 m accuracy were obtained by differential GPS surveying. Tables D, E, and F provide latitude/longitude and UTM coordinates for seismographs in Lines 1, 2, and 3, respectively. Table G describes the station numbering convention for all three lines.

### Instrumentation for the Land Arrays

The ability to collect onshore-offshore seismic data using marine air-guns is predicated on the use of seismic instruments capable of collecting large volumes of data via continuous recording. Sufficient PASSCAL Reftek instruments were made available by the Incorporated Research Institutions for Seismology (IRIS). These instruments were able to collect several days of continuous data at high sample rates. The LARSE experiment used a total of 215 Reftek instruments assembled from the following organizations: IRIS/PASSCAL (182), Southern California Earthquake Center (18), Los Alamos National Laboratory (5), and the University of Texas at El Paso (10). These instruments had a variety of specifications which are summarized in Table H.

## Recording Instrumentation and Timing

The Refteks were deployed in continuous-mode acquisition. In-field instrument data capacity was a major constraining factor given the anticipated seven days of *Ewing* air-gun source time. Only the vertical components of the L-28 (4.5-Hz) sensors were recorded. The sampling rate was 10 msec (100 sps), for a Nyquist frequency of 50 Hz. Data compression in the instrument was employed. The instruments in general had sufficient storage capacity to collect the entire set of ship sources.

Power for the instruments was provided by large-capacity car batteries (110 amp-hr), sufficient to last the entire field deployment. Field checking was conducted to replace batteries as necessary.

Accurate timing was provided using the Global Positioning System (GPS). Fifty-seven instruments had internal GPS units. Additional instruments had external GPS units attached for the duration of the experiment. The clocks of the remaining instruments were set upon initial deployment, during site visits, and upon instrument retrieval.

## Land Field Operations

The deployment, maintenance, and retrieval of the three land arrays were conducted by the USGS, USC, University of Texas El Paso (UTEP), and Caltech personnel. These activities were performed in coordination with the R/V *Ewing*'s activities.

The deployment of the three lines was conducted in the two days immediately prior of the departure of the *Ewing* from the port of Long Beach (Table J). The USGS and USC deployed 86 stations on Line 1. The USGS and UTEP deployed 47 stations in Line 2. Caltech deployed the 41 stations in Line 3. The instruments with attached GPS were programmed to start on the first day of *Ewing* air-gun shooting; instruments with no attached GPS were started immediately upon installation. The *Ewing* traversed line 01 (Fig. 2a) without the MCS streamer, firing the air-guns every 60 seconds, in order to avoid signal overlap at the ocean-bottom

seismographs (OBS's). At San Clemente Island, the streamer was deployed and Lines 01R, 01X, 01Y were shot with a shot interval of 20 seconds (Tables A, B), lines 3 (03, 03R) and 2 (02, 02R, 02X, 02Y, 02Z) were shot with transit lines in between (TR1, TR2) (Tables A, B; Fig. 2a, 2b). Finally, due to poor acquisition conditions during most passes on Line 1, including wind and daytime recording for all but line 1Y (one half of the offshore part of Line 1), Line 1 was reshot (lines 1A, 1B; Tables A, B; Fig. 2a). Land recorders were serviced approximately twice each during the 8 days of air-gun shooting.

### Data Archival

Data were transferred from the Reftek instruments to archive 8-mm cartridge tapes using SUN computer workstations located at the field center in Glendora, California. Four workstations were configured with PASSCAL software and 8-mm cartridge tape drives. A dozen persons were employed over a 1-1/2 day period to perform the data transfer. The data were transferred to the field tapes in Reftek field format for subsequent translation and reduction to be conducted after the completion of the field experiment.

## DATA REDUCTION

### Organization of Data: Two Data Products

The LARSE data were first reduced as common-receiver-gathers (CRGs)--one for each land station, each containing as many as 22,128 seismograms, representing shots on all 16 shiptracks (Tables A, D). This set of data is termed "Product 1".

Although organizationally simple, Product 1 is unwieldy if used for the analysis of any one ship track. The data were next resorted by the 16 individual ship tracks. This set of data is termed "Product 2". A more complete description of both products is provided below and in Tables L through N.

## Data Reduction

The data reduction steps are illustrated in Fig. 3. The data were originally collected in continuous mode in 10-minute time windows. An amplitude debias and instrument timing (clock drift) corrections were applied to each time window. Individual seismograms were then extracted from the entire set of data windows using the air-gun shot times provided by the *Ewing*. UTM coordinates were obtained from the source and receiver latitude/longitude values; the WGS-84 spheroid and UTM zone 11 were used in the calculations. Using the source-receiver offset computed from the UTM values, a reduced travel-time correction (linear moveout) of 6.0 km/s was applied to each seismogram. Product-1 CRGs were produced in SEG-Y format followed by a resort of the data into Product-2 CRGs.

In order to reduce such a large volume of data in an efficient manner, new software was created at USC which was compatible with software provided by IRIS/PASSCAL. Table K describes this software in more detail.

## Product One: Common Receiver Gathers

The CRGs for Product 1 contain the entire data set in its simplest form. For any station in Lines 1-3 , the entire set of seismograms produced by all 22,128 *Ewing* air-gun shots are contained in the station's CRG. Table L describes the internal characteristics of a CRG and describes which seismograms are associated with which ship tracks.

Product 1 consists of seismograms in SEG-Y format. Each seismogram is 30 sec in length (3000 samples at 10 msec sampling). Since the data is reduced by 6.0 km/sec, $t_{reduced} = 0$ is at sample 500 so that the first sample in the seismogram is at $t_{reduced} = -5.0$ sec (actually, $t_{reduced} = -4.990$ sec). The last sample of the data is at $t_{reduced} = 25.0$ sec. The ship and recorder locations in both latitude/longitude and UTM coordinates are saved in the trace headers. The source-receiver offset used in the reduced travel-time correction as well as the actual time shift (i.e., $\Delta t$ = offset/6 km $s^{-1}$) are also saved in the trace headers (see Table N).

There were a total of 174 gathers in Lines 1-3. These gathers are numbered in sequential order as 1-86 for Line 1 (south to north), 87-133 for Line 2 (south to north), and 134-174 for Line 3 (west to east). Gathers 1 and 2 arefrom stations located on San Clemente Island (south to north); and gathers 3 and 4 from Santa Catalina Island (south to north). Tables D, E, F, and L provide the assignment of cumulative gather numbers for all three lines.

Due to the deployment of two separate instruments at stations 08 and 32 (Line 1), there is an organizational difference between a "common-receiver gather" (CRG) and a "common station gather" (CSG). There are 174 unique CRGs whereas there are 172 CSGs. These numbers are stored in the SEG-Y trace headers as separate values.

**Product Two: Common Receiver Gathers by Ship Track**

The large number of seismograms/CRG in Product 1 makes Product 1 unwieldly. For example, in order to extract seismograms for ship track #1 (Line 01, Table A), seismograms 1-653 must be winnowed from the CRG. In order to obtain Line 01 for all stations, all 174 CRGs must be read. One must sort through the 25 8-mm cartridge tapes of Product 1 in order to access all 174 CRGs for a single ship track. Product 2 represents such a sort.

**Description of SEG-Y Headers in Data Archive**

Many of the pertinent parameters which describe the data or the LARSE field parameters are contained in the SEG-Y trace headers of both Products 1 and 2. Table N provides a full list of the SEG-Y trace headers and identifies in bold-formatted text which headers contain values specific to the LARSE experiment. Certain SEG-Y header fields were redefined in order to store such experiment-specific information These redefinitions were chosen to be consistent with the IRIS/PASSCAL and IASPEI versions of SEG-Y. LARSE-specific information includes air-gun source depth, source time, source shot-point number, source location (in both latitude/longitude and UTM coordinates), station stake number, station location (latitude/longitude and UTM), Line number (1-3), instrument number, instrument type, and sensor type. Data-reduction parameters

include clock-correction time shifts, reduced travel-time shifts, reducing velocity, and instrument amplitude debias. Data-format values include number of samples in the seismogram and time of first sample the reduced travel time correction. Data indexing values include CRG # (1-174), CRG # within the Lines 1 (1-86), Line2 (1-47), and Line 3 (1-41), seismogram # within the CRG, ship track number, seismogram # within the ship track, and common-station gather # (CSG).

The source and receiver coordinates and elevations, whether in degrees or UTM coordinates are provided relative to the WGS-84 spheroid, the spheroid used in the reduction of the GPS survey data.

## DESCRIPTION OF THE DATA

The onshore-offshore data vary in quality based on the following factors: time of acquisition (day or night), prevailing weather conditions, proximity to noise sources in the Los Angeles region (freeways, machinery), near surface conditions, and gross geology under the receiver sites (e.g., sedimentary rocks, basement rocks). The *Ewing* air-gun sources in general were sufficient to propagate as far as 200+ km.

Due to the continuous sources by the *Ewing* and continuous recording on Lines 1-3, the data includes not only 2-D inline profiles (Product 2) but 3-D cross-line profiles (Product 1) (Figure 1). Fig.4 illustrates the 3-D behavior of the source-receiver geometry for all three lines. In each figure, the source-receiver offset distance is divided by 6 km/s in order to plot the nominal arrival time of the Pg phase for all *Ewing* sources at each station in a given line. Water depth, basin sediments, receiver elevations, etc. will, of course, affect actual arrival times.

When the *Ewing* was moving radially toward/away to the station (i.e., inline to the station's array), strong linear moveout is visible. When the *Ewing* was moving in a more oblique to transverse direction, the source-receiver distance changed less rapidly as did the arrival time. Because the *Ewing* collected Lines 03 and 03R by sailing away from the coastline at El Segundo then doubling back on its track, the Pg traveltime curves for these two lines have a symmetric appearance. However, since the traveltime is plotted as a function of shot number, when the

Ewing source interval changed (e.g., line 01 to line 01R and line 02 to line 02R), resulting norminal Pg arrival times are asymmetric (Fig. 4). (Note: offset/ 6 $kms^{-1}$ is plotted in Fig. 4; whereas actual traveltime minus offset/6 $kms^{-1}$ is plotted in Product 1).

The nominal Pg arrival-time plot of Fig. 4 can aid in the identification of phases PmP and Pn as well as Pg. For example, PmP is likely to be most visible when the source-receiver distance is near the distance for critical Moho reflection; thus, one would look within a specific window of arrival time. Pn will appear as a first arrival only beyond the crossover distance, and one would look within another window of arrival time

Representative portions of each of the 174 CRGs are displayed in the Appendix. For the CRG at each station, a portion of the sources which are inline to the station's array is displayed. For Line 1 (stations 1-86), *Ewing* Lines 1Y and 1B are shown. For Line 2 (stations 87-133), Line 02 is shown and for Line 3 (stations 134-174), Line 03 is shown. The variations in data quality are observable.

In general, Pg is visible in most CRGs except those in the heart of the Los Angeles basin and San Gabriel and San Fernando valleys. The PmP phase is observable in the offset ranges of 60-100 km. Beyond this offset distance, a Pn arrival can be seen at selected stations.

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## TABLE A. Marine Line Names and Line Numbers

| Line Name | Internal Ship Track# | Cumul Air-gun Sources | # Traces (# of shots) | R/V Ewing Shot Point# Start | End |
|---|---|---|---|---|---|
| 01 | 1 | 1- 653 | 653 | 101 | 753 |
| 01R | 2 | 654- 2963 | 2310 | 105 | 2414 |
| 01X | 3 | 2964- 3811 | 848 | 101 | 935 |
| 01Y | 4 | 3812- 4779 | 968 | 101 | 1068 |
| TR1 | 5 | 4780- 5755 | 976 | 101 | 783 |
| 03 | 6 | 5756- 8201 | 2446 | 101 | 2546 |
| 03R | 7 | 8202-10689 | 2488 | 101 | 2587 |
| TR2 | 8 | 10690-11083 | 394 | 101 | 494 |
| 02 | 9 | 11084-14200 | 3117 | 101 | 3215 |
| 02R | 10 | 14201-14922 | 722 | 101 | 822 |
| 02X | 11 | 14923-16218 | 1296 | 101 | 1369 |
| 02Y | 12 | 16219-17737 | 1519 | 101 | 1619 |
| 02Z | 13 | 17738-18520 | 783 | 101 | 883 |
| TR3 | 14 | 18521-19594 | 1074 | 101 | 1174 |
| 01A | 15 | 19595-20821 | 1227 | 101 | 1327 |
| 01B | 16 | 20822-22128 | 1307 | 101 | 1407 |

Note 1: Internal ShipTrack # is used within the Data Archive SEG-Y trace headers to identify the ship Line Name.

Note 2: Cumulative Air-gun Sources is equivalent to the seismogram number in the Product I common receiver gathers (as described in Table L). One Product I common receiver gather will have 22,128 traces per gather which contains 16 ship tracks as recorded at the station recording the gather.

## TABLE B. R/V *Ewing* LARSE Line Start and End Times and Locations

| | Start of Line | | | End of Line | | |
|---|---|---|---|---|---|---|
| Line No. | UTC Day:HrMn | Lat. (N) Deg. Min. | Long. (W) Deg. Min. | UTC Day:HrMn | Lat. (N) Deg. Min. | Long. (W) Deg. Min. |
| 01 | 286:1849 | 33 38.191 | 118 07.055 | 287:0541 | 32 56.869 | 118 25.333 |
| 01R | 287:1155 | 33 49.475 | 118 07.194 | 288:0124 | 33 37.276 | 118 11.621 |
| 01X | 288:0128 | 33 36.951 | 118 11.505 | 288:0632 | 33 15.103 | 118 15.692 |
| 01Y | 288:0632 | 33 15.091 | 118 15.704 | 288:1235 | 33 35.179 | 118 12.782 |
| TR1 | 288:1236 | 33 35.125 | 118 12.855 | 288:2144 | 33 49.777 | 118 30.522 |
| 03 | 288:2145 | 33 49.768 | 118 30.569 | 289:1210 | 33 28.300 | 119 42.396 |
| 03R | 289:1211 | 33 28.308 | 119 42.303 | 290:0237 | 33 51.075 | 118 27.880 |
| (03R | 289:1211 | 33 28.308 | 119 42.303 | 290:0225 | 33 50.479 | 118 28.323) |
| TR2 | 290:0238 | 33 51.147 | 118 27.950 | 290:0459 | 33 59.144 | 118 35.305 |
| (TR2 | 290:0239 | 33 51.171 | 118 27.983 | 290:0458 | 33 59.118 | 118 35.302) |
| 02 | 290:0517 | 34 00.507 | 118 35.383 | 291:0154 | 32 38.305 | 118 43.391 |
| (02 | 290:0551 | 33 59.170 | 118 34.841 | 291:0147 | 32 37.892 | 118 43.487) |
| 02R | 291:0155 | 32 38.363 | 118 43.386 | 291:1956 | 33 59.187 | 118 35.040 |
| (02R | 291:0156 | 32 38.444 | 118 43.387 | 291:1955 | 33 58.784 | 118 35.080) |
| 02X | 291:2052 | 33 58.996 | 118 34.911 | 292:0404 | 33 26.080 | 118 40.439 |
| (02X | 291:2103 | 33 58.203 | 118 35.002 | 292:0359 | 33 26.440 | 118 40.279) |
| 02Y | 292:0405 | 33 26.060 | 118 40.465 | 292:1231 | 33 59.090 | 118 35.130 |
| (02Y | 292:0406 | 33 26.008 | 118 40.505 | 292:1232 | 33 58.991 | 118 35.033) |
| 02Z | 292:1329 | 33 59.209 | 118 34.984 | 292:1750 | 33 41.121 | 118 37.782 |
| (02Z | 292:1336 | 33 58.754 | 118 35.088 | 292:1743 | 33 41.548 | 118 38.042) |
| TR3 | 292:1751 | 33 41.082 | 118 37.708 | 292:2349 | 33 25.458 | 118 11.820 |
| (TR3 | 292:1753 | 33 41.043 | 118 37.614 | 292:2350 | 33 25.454 | 118 11.805) |
| 01A | 292:2351 | 33 25.314 | 118 11.858 | 293:0640 | 32 58.774 | 118 23.739 |
| (01A | 292:2352 | 33 25.218 | 118 11.890 | 293:0558 | 33 00.418 | 118 23.248) |
| 01B | 293:0640 | 32 58.815 | 118 23.759 | 293:1356 | 33 28.895 | 118 10.714 |
| (01B | 293:0630 | 32 58.610 | 118 23.032 | 293:1355 | 33 28.797 | 118 10.739) |
| 04 | 293:1400 | 33 29.156 | 118 10.808 | 293:1644 | 33 32.535 | 118 02.362 |
| (04 | 293:1355 | 33 28.797 | 118 10.739 | 293:1630 | 33 32.385 | 118 02.975) |
| 05 | 293:1712 | 33 32.892 | 118 00.680 | 293:1835 | 33 32.842 | 117 56.077 |
| 06a | 293:1837 | 33 32.829 | 117 56.121 | 293:2128 | 33 29.735 | 118 09.673 |
| 06b | 293:2147 | 33 28.663 | 118 09.354 | 294:0231 | 33 24.877 | 117 46.034 |
| 06c | 294:0242 | 33 24.300 | 117 45.355 | 294:0433 | 33 17.037 | 117 41.468 |

Parens indicate times and locations noted in MCS log aboard ship; other times and locations taken from digital shot log provided by Stephanus Budhypramono of LDEO.

## TABLE C: Abridged *Ewing* Shot Times and Locations

| Year:Date:Hr:Min:Sec | FFID | Lat. | Long. | Line Number |
|---|---|---|---|---|
| 94+286:18:49:17.736 | 00101 | N 33 38.1910 | W 118 07.0551 | LA01 |
| 94+286:19:00:18.473 | 00112 | N 33 37.5247 | W 118 07.3583 | LA01 |
| 94+286:20:00:18.483 | 00172 | N 33 33.7540 | W 118 08.9776 | LA01 |
| 94+286:21:00:20.715 | 00232 | N 33 29.8386 | W 118 10.2979 | LA01 |
| 94+286:22:00:21.955 | 00292 | N 33 25.8759 | W 118 11.6982 | LA01 |
| 94+286:23:00:24.907 | 00352 | N 33 21.7805 | W 118 13.1994 | LA01 |
| 94+287:00:00:28.404 | 00412 | N 33 17.8508 | W 118 14.5750 | LA01 |
| 94+287:01:00:29.640 | 00472 | N 33 14.2768 | W 118 16.2731 | LA01 |
| 94+287:02:00:30.687 | 00532 | N 33 10.7990 | W 118 18.2605 | LA01 |
| 94+287:03:00:31.687 | 00592 | N 33 07.0360 | W 118 20.1193 | LA01 |
| 94+287:04:00:34.916 | 00652 | N 33 03.3934 | W 118 22.0520 | LA01 |
| 94+287:05:00:36.116 | 00712 | N 32 59.5526 | W 118 23.9744 | LA01 |
| 94+287:05:41:37.305 | 00753 | N 32 56.8693 | W 118 25.3331 | LA01 |
| 94+287:11:55:42.459 | 00105 | N 32 49.4752 | W 118 07.1937 | LARSE01R |
| 94+287:12:00:08.057 | 00118 | N 32 49.6061 | W 118 07.5666 | LARSE01R |
| 94+287:13:00:03.960 | 00297 | N 32 51.5937 | W 118 12.7275 | LARSE01R |
| 94+287:14:00:20.228 | 00474 | N 32 53.6265 | W 118 17.7704 | LARSE01R |
| 94+287:15:00:10.140 | 00644 | N 32 55.3614 | W 118 22.7083 | LARSE01R |
| 94+287:16:00:18.452 | 00806 | N 32 58.6314 | W 118 24.5302 | LARSE01R |
| 94+287:17:00:03.958 | 00979 | N 33 02.8678 | W 118 22.2462 | LARSE01R |
| 94+287:18:00:19.628 | 01154 | N 33 07.1215 | W 118 20.0302 | LARSE01R |
| 94+287:19:00:18.668 | 01323 | N 33 11.2740 | W 118 17.8620 | LARSE01R |
| 94+287:20:00:20.480 | 01495 | N 33 15.4655 | W 118 15.6491 | LARSE01R |
| 94+287:21:00:03.943 | 01666 | N 33 19.8046 | W 118 13.8989 | LARSE01R |
| 94+287:22:00:11.184 | 01838 | N 33 24.2134 | W 118 12.3503 | LARSE01R |
| 94+287:23:00:00.920 | 02011 | N 33 28.6400 | W 118 10.7141 | LARSE01R |
| 94+288:00:00:08.128 | 02186 | N 33 33.2089 | W 118 10.7523 | LARSE01R |
| 94+288:01:00:02.001 | 02353 | N 33 37.0877 | W 118 12.6862 | LARSE01R |
| 94+288:01:24:01.118 | 02414 | N 33 37.2756 | W 118 11.6212 | LARSE01R |
| 94-288:01:28:30.803 | 00101 | N 33 36.9514 | W 118 11.5048 | LARSE01X |
| 94+288:02:00:05.743 | 00174 | N 33 34.5805 | W 118 11.0279 | LARSE01X |
| 94+288:03:00:20.624 | 00339 | N 33 30.2560 | W 118 10.1924 | LARSE01X |
| 94+288:04:00:17.875 | 00513 | N 33 25.7471 | W 118 11.6947 | LARSE01X |
| 94+288:05:00:13.976 | 00684 | N 33 21.3779 | W 118 13.3172 | LARSE01X |
| 94+288:06:00:21.627 | 00854 | N 33 17.0405 | W 118 14.8050 | LARSE01X |
| 94+288:06:32:37.925 | 00935 | N 33 15.1029 | W 118 15.6916 | LARSE01X |
| 94+288:06:32:56.018 | 00101 | N 33 15.0910 | W 118 15.7035 | LARSE01Y |
| 94+288:07:00:18.578 | 00153 | N 33 14.5518 | W 118 16.9116 | LARSE01Y |
| 94+288:08:00:18.152 | 00314 | N 33 17.4955 | W 118 14.6791 | LARSE01Y |
| 94+288:09:00:17.824 | 00478 | N 33 21.7296 | W 118 13.3686 | LARSE01Y |
| 94+288:10:00:21.044 | 00644 | N 33 25.9674 | W 118 11.7275 | LARSE01Y |
| 94+288:11:00:17.286 | 00814 | N 33 30.2943 | W 118 10.0756 | LARSE01Y |
| 94+288:12:00:04.803 | 00976 | N 33 34.5261 | W 118 11.0721 | LARSE01Y |
| 94+288:12:35:17.847 | 01068 | N 33 35.1791 | W 118 12.7817 | LARSE01Y |
| 94-288:12:36:27.396 | 00101 | N 33 35.1254 | W 118 12.8549 | LARSETR1 |
| 94+288:13:00:07.504 | 00167 | N 33 33.8226 | W 118 14.2356 | LARSETR1 |
| 94+288:14:00:03.490 | 00322 | N 33 30.7704 | W 118 17.3762 | LARSETR1 |
| 94+288:14:30:28.903 | 00393 | N 33 30.2095 | W 118 19.3732 | LARSETR1 |
| 94-288:17:47:10.731 | 00101 | N 33 34.3285 | W 118 31.1544 | LARSETR1 |
| 94+288:18:00:08.860 | 00138 | N 33 35.1506 | W 118 31.8033 | LARSETR1 |

94+288:19:00:01.583 00312 N 33 39.4213 W 118 33.4989 LARSETR1
94+288:20:00:02.447 00488 N 33 43.8144 W 118 31.5320 LARSETR1
94+288:21:00:19.953 00663 N 33 48.1076 W 118 29.3360 LARSETR1
94+288:21:44:45.676 00783 N 33 49.7766 W 118 30.5224 LARSETR1

94+288:21:45:16.921 00101 N 33 49.7675 W 118 30.5687 LARSE03
94+288:22:00:18.422 00145 N 33 49.4030 W 118 31.9168 LARSE03
94+288:23:00:12.138 00314 N 33 47.9471 W 118 36.9643 LARSE03
94+289:00:00:00.042 00476 N 33 46.3380 W 118 41.7889 LARSE03
94+289:01:00:12.994 00648 N 33 44.7615 W 118 46.9474 LARSE03
94+289:02:00:09.955 00817 N 33 43.3139 W 118 52.1335 LARSE03
94+289:03:00:08.048 00996 N 33 41.5772 W 118 57.5282 LARSE03
94+289:04:00:05.970 01184 N 33 40.0384 W 119 03.2405 LARSE03
94+289:05:00:17.889 01362 N 33 38.2112 W 119 08.4451 LARSE03
94+289:06:00:11.771 01537 N 33 36.8048 W 119 13.7917 LARSE03
94+289:07:00:21.272 01713 N 33 35.2201 W 119 19.0487 LARSE03
94+289:08:00:11.164 01873 N 33 33.8611 W 119 23.8832 LARSE03
94+289:09:00:22.406 02036 N 33 32.2860 W 119 28.7390 LARSE03
94+289:10:00:16.666 02200 N 33 30.6818 W 119 33.6381 LARSE03
94+289:11:00:04.329 02367 N 33 29.4110 W 119 38.7410 LARSE03
94+289:12:00:13.780 02524 N 33 28.6629 W 119 43.0103 LARSE03
94+289:12:10:24.907 02546 N 33 28.3001 W 119 42.3963 LARSE03

94+289:12:11:30.943 00101 N 33 28.3078 W 119 42.3029 LARSE03R
94+289:13:00:09.192 00230 N 33 29.4439 W 119 38.2608 LARSE03R
94+289:14:00:07.055 00402 N 33 30.9287 W 119 33.0648 LARSE03R
94+289:15:00:01.568 00581 N 33 32.5004 W 119 27.6512 LARSE03R
94+289:16:00:17.727 00757 N 33 34.1488 W 119 22.4373 LARSE03R
94+289:17:00:08.771 00923 N 33 35.8234 W 119 17.5013 LARSE03R
94+289:18:00:08.189 01100 N 33 37.2967 W 119 12.0843 LARSE03R
94+289:19:00:09.041 01276 N 33 38.7931 W 119 06.7238 LARSE03R
94+289:20:00:15.892 01460 N 33 40.4540 W 119 01.1934 LARSE03R
94+289:21:00:02.038 01645 N 33 42.1461 W 118 55.6502 LARSE03R
94+289:22:00:03.040 01822 N 33 43.6823 W 118 50.3249 LARSE03R
94+289:23:00:16.347 01991 N 33 45.2109 W 118 45.2325 LARSE03R
94+290:00:00:01.250 02159 N 33 46.7763 W 118 40.1895 LARSE03R
94+290:01:00:03.223 02329 N 33 48.4177 W 118 35.1116 LARSE03R
94+290:02:00:16.623 02491 N 33 49.9201 W 118 30.2992 LARSE03R
94+290:02:37:25.192 02587 N 33 51.0747 W 118 27.8797 LARSE03R

94+290:02:38:46.229 00101 N 33 51.1466 W 118 27.9502 LARSETR2
94+290:03:00:23.054 00152 N 33 52.0566 W 118 29.4076 LARSETR2
94+290:04:00:19.519 00319 N 33 54.8050 W 118 33.7771 LARSETR2
94+290:04:59:09.433 00494 N 33 59.1441 W 118 35.3047 LARSETR2

94-290:05:17:27.928 00101 N 34 00.5065 W 118 35.3833 LARSE02
94+290:06:00:17.404 00129 N 33 58.5106 W 118 35.1231 LARSE02
94+290:07:00:14.853 00292 N 33 54.2299 W 118 35.8275 LARSE02
94+290:08:00:03.996 00442 N 33 50.2701 W 118 36.4737 LARSE02
94+290:09:00:11.887 00599 N 33 46.0755 W 118 37.1957 LARSE02
94+290:10:00:07.081 00762 N 33 41.7912 W 118 38.1739 LARSE02
94+290:11:00:11.012 00924 N 33 37.5272 W 118 38.8884 LARSE02
94+290:12:00:12.071 01086 N 33 33.2521 W 118 39.5734 LARSE02
94+290:13:00:19.431 01243 N 33 29.0833 W 118 40.2080 LARSE02
94+290:14:00:21.256 01397 N 33 25.0075 W 118 40.2710 LARSE02
94+290:15:00:24.276 01543 N 33 21.1104 W 118 40.4225 LARSE02
94+290:16:00:10.167 01692 N 33 17.0818 W 118 40.3679 LARSE02
94+290:17:00:10.257 01842 N 33 13.1128 W 118 40.5788 LARSE02

94+290:18:00:20.462 01978 N 33 09.5246 W 118 40.5967 LARSE02
94+290:19:00:19.537 02112 N 33 05.9164 W 118 40.6276 LARSE02
94+290:20:00:04.363 02261 N 33 01.8875 W 118 40.6963 LARSE02
94+290:21:00:22.191 02408 N 32 58.0202 W 118 41.1395 LARSE02
94+290:22:00:04.289 02556 N 32 54.0071 W 118 41.6480 LARSE02
94+290:23:00:08.091 02723 N 32 49.5139 W 118 42.1385 LARSE02
94+291:00:00:16.082 02898 N 32 44.8263 W 118 42.5964 LARSE02
94+291:01:00:03.382 03077 N 32 40.0689 W 118 43.1260 LARSE02
94+291:01:54:01.400 03215 N 32 38.3049 W 118 43.3906 LARSE02

94+291:01:54:58.840 00101 N 32 38.3632 W 118 43.3877 LARSE02R
94+291:02:00:58.973 00105 N 32 38.7186 W 118 43.2985 LARSE02R
94+291:03:00:59.366 00145 N 32 42.5931 W 118 43.0442 LARSE02R
94+291:03:59:30.434 00184 N 32 46.6377 W 118 42.4137 LARSE02R
94+291:04:59:31.872 00224 N 32 50.6815 W 118 41.9928 LARSE02R
94+291:05:59:32.775 00264 N 32 54.9600 W 118 41.5864 LARSE02R
94+291:06:59:33.541 00304 N 32 59.4535 W 118 40.9761 LARSE02R
94+291:07:59:36.050 00344 N 33 03.6547 W 118 40.7081 LARSE02R
94+291:08:59:37.022 00384 N 33 08.4115 W 118 40.7063 LARSE02R
94+291:09:59:40.175 00424 N 33 13.0746 W 118 40.6950 LARSE02R
94+291:10:59:40.410 00464 N 33 17.7123 W 118 40.4246 LARSE02R
94+291:11:59:41.015 00504 N 33 22.3501 W 118 40.3197 LARSE02R
94+291:12:59:41.279 00544 N 33 27.2905 W 118 40.2475 LARSE02R
94+291:13:59:43.062 00584 N 33 32.1174 W 118 39.8743 LARSE02R
94+291:14:59:44.269 00624 N 33 36.7405 W 118 38.9881 LARSE02R
94+291:15:59:46.210 00664 N 33 41.1264 W 118 38.0487 LARSE02R
94+291:16:59:47.300 00704 N 33 45.6855 W 118 37.5693 LARSE02R
94+291:17:59:48.515 00744 N 33 50.2230 W 118 36.7155 LARSE02R
94+291:18:59:50.415 00784 N 33 54.8195 W 118 35.7287 LARSE02R
94+291:19:56:51.976 00822 N 33 59.1866 W 118 35.0395 LARSE02R
94+291:19:56:51.976 00822 N 33 59.1866 W 118 35.0395 LARSE02R

94-291:20:52:55.502 00101 N 33 58.9955 W 118 34.9105 LARSE02X
94-291:21:00:15.675 00123 N 33 58.4382 W 118 34.9741 LARSE02X
94+291:22:00:03.602 00275 N 33 54.1497 W 118 35.7090 LARSE02X
94+291:23:00:07.734 00455 N 33 49.5534 W 118 36.5912 LARSE02X
94+292:00:00:08.587 00635 N 33 44.7232 W 118 37.6345 LARSE02X
94+292:01:00:12.467 00815 N 33 40.0411 W 118 38.3838 LARSE02X
94+292:02:00:16.561 00995 N 33 35.5514 W 118 39.0806 LARSE02X
94+292:03:00:16.490 01175 N 33 31.0242 W 118 39.8653 LARSE02X
94+292:04:00:18.522 01355 N 33 26.3980 W 118 40.2904 LARSE02X
94+292:04:04:58.929 01369 N 33 26.0795 W 118 40.4389 LARSE02X

94+292:04:05:21.494 00101 N 33 26.0601 W 118 40.4650 LARSE02Y
94+292:05:00:02.389 00265 N 33 27.1016 W 118 40.4038 LARSE02Y
94+292:06:00:06.067 00445 N 33 31.2086 W 118 39.9953 LARSE02Y
94+292:07:00:06.608 00625 N 33 35.5913 W 118 39.2658 LARSE02Y
94+292:08:00:10.380 00805 N 33 39.8117 W 118 38.4313 LARSE02Y
94+292:09:00:15.273 00985 N 33 43.9213 W 118 37.7421 LARSE02Y
94+292:10:00:15.065 01165 N 33 48.0791 W 118 36.9137 LARSE02Y
94+292:11:00:17.304 01345 N 33 52.4458 W 118 36.0768 LARSE02Y
94+292:12:00:00.702 01524 N 33 56.7512 W 118 35.5050 LARSE02Y
94+292:12:31:41.399 01619 N 33 59.0900 W 118 35.1297 LARSE02Y

94-292:13:29:27.255 00101 N 33 59.2088 W 118 34.9838 LARSE02Z
94+292:14:00:06.400 00193 N 33 57.2305 W 118 35.3422 LARSE02Z
94+292:15:00:08.704 00373 N 33 53.2898 W 118 36.1026 LARSE02Z
94+292:16:00:10.146 00553 N 33 48.8349 W 118 36.7070 LARSE02Z

94+292:17:00:12.928 00733 N 33 44.6393 W 118 37.4671 LARSE02Z
94+292:17:50:16.318 00883 N 33 41.1206 W 118 37.7817 LARSE02Z

94+292:17:51:16.279 00101 N 33 41.0819 W 118 37.7084 LARSETR3
94+292:19:00:17.389 00308 N 33 38.2294 W 118 32.7562 LARSETR3
94+292:20:00:01.172 00487 N 33 35.5438 W 118 28.4572 LARSETR3
94+292:21:00:02.924 00667 N 33 32.9193 W 118 23.7531 LARSETR3
94+292:22:00:05.387 00847 N 33 30.4232 W 118 19.0269 LARSETR3
94+292:23:00:09.728 01027 N 33 27.8195 W 118 14.6585 LARSETR3
94-292:23:49:10.440 01174 N 33 25.4579 W 118 11.8203 LARSETR3

94-292:23:51:10.581 00101 N 33 25.3143 W 118 11.8581 LARSE01A
94+293:00:00:09.301 00128 N 33 24.6750 W 118 12.0683 LARSE01A
94+293:01:00:10.601 00308 N 33 20.3659 W 118 13.7052 LARSE01A
94+293:02:00:14.052 00488 N 33 16.0679 W 118 15.3151 LARSE01A
94+293:03:00:15.753 00668 N 33 11.9929 W 118 17.5168 LARSE01A
94+293:04:00:18.514 00848 N 33 07.9846 W 118 19.7611 LARSE01A
94+293:05:00:02.909 01027 N 33 04.0656 W 118 21.5309 LARSE01A
94+293:06:00:03.221 01207 N 33 00.2975 W 118 23.2942 LARSE01A
94+293:06:40:04.022 01327 N 32 58.7739 W 118 23.7394 LARSE01A

94+293:06:40:41.713 00101 N 32 58.8149 W 118 23.7586 LARSE01B
94+293:07:00:01.153 00159 N 33 00.1870 W 118 23.5451 LARSE01B
94+293:08:00:03.507 00339 N 33 04.2791 W 118 21.4781 LARSE01B
94+293:09:00:05.874 00519 N 33 07.9989 W 118 19.4876 LARSE01B
94+293:10:00:08.149 00699 N 33 11.7962 W 118 17.6380 LARSE01B
94+293:11:00:11.048 00879 N 33 15.8636 W 118 15.6575 LARSE01B
94+293:12:00:14.169 01059 N 33 20.2040 W 118 13.6493 LARSE01B
94+293:13:00:15.813 01239 N 33 24.6972 W 118 12.0093 LARSE01B
94+293:13:56:16.171 01407 N 33 28.8957 W 118 10.7140 LARSE01B

94+293:14:00:13.799 00101 N 33 29.1561 W 118 10.8084 LARSE04
94+293:15:00:16.574 00151 N 33 31.1685 W 118 08.3868 MARSE04
94+293:16:00:19.087 00331 N 33 31.9416 W 118 04.5500 MARSE04
94-293:16:44:02.473 00462 N 33 32.5354 W 118 02.3622 MARSE04

94-293:17:12:13.662 00101 N 33 32.8920 W 118 00.6802 MARSE05
94-293:17:18:44.404 00104 N 33 33.0136 W 118 00.1301 lARSE05
94-293:17:45:12.836 00101 N 33 33.4681 W 117 57.7723 test
94-293:18:28:19.082 00101 N 33 32.9983 W 117 55.5490 LARSE05
94+293:18:35:11.795 00111 N 33 32.8422 W 117 56.0770 larse05

94-293:18:35:45.905 00101 N 33 32.8290 W 117 56.1213 LARSE06
94+293:19:00:04.281 00174 N 33 32.2586 W 117 57.9749 LARSE06
94+293:20:00:06.283 00354 N 33 31.3082 W 118 02.7146 LARSE06
94+293:21:00:08.775 00534 N 33 30.2118 W 118 07.4535 LARSE06
94+293:21:28:09.762 00618 N 33 29.7351 W 118 09.6726 LARSE06
94+293:21:47:10.528 00675 N 33 28.6632 W 118 09.3539 LARSE06
94+293:22:00:11.057 00714 N 33 28.4705 W 118 08.2971 LARSE06
94+293:23:00:13.811 00894 N 33 27.9199 W 118 03.3360 LARSE06
94+294:00:00:16.250 01074 N 33 26.9317 W 117 58.3716 LARSE06
94+294:01:00:18.513 01254 N 33 26.1537 W 117 53.4019 LARSE06
94+294:02:00:18.913 01434 N 33 25.2776 W 117 48.5949 LARSE06
94+294:02:31:01.953 01526 N 33 24.8771 W 117 46.0337 LARSE06
94+294:02:42:01.143 01559 N 33 24.2997 W 117 45.3553 LARSE06
94+294:03:00:01.848 01613 N 33 23.0430 W 117 44.6647 LARSE06
94+294:04:00:02.545 01793 N 33 19.0806 W 117 42.6310 LARSE06
94-294:04:31:30.294 01885 N 33 17.0371 W 117 41.4682 LARSE06

# TABLE D: Line 1: Seal Beach - San Gabriel - El Mirage Locations - Lat/Long and UTM

Station Locations
World Geodetic Survey 1984 Reference Geoid

| Gather # in Line 1 | Cumulative gather# | Station Name | Lat(°N) | Long(°W) | UTM X (m) | UTM Y (m) | Altitude (m) |
|---|---|---|---|---|---|---|---|
| 1 | 1 | 4004 | 33.4482 | -118.5475 | 356167. | 3702044. | 498 |
| 2 | 2 | 4003 | 33.3184 | -118.3197 | 377159. | 3687360. | 432 |
| 3 | 3 | 4002 | 33.0087 | -118.5675 | 353582. | 3653340. | 159 |
| 4 | 4 | 4001 | 32.8777 | -118.4506 | 364298. | 3638657. | 528 |
| 5 | 5 | 2455 | 33.7452 | -118.0851 | 399494. | 3734435. | -32 |
| 6 | 6 | 2445 | 33.7533 | -118.0805 | 399933. | 3735325. | -31 |
| 7 | 7 | 2435 | 33.7611 | -118.0731 | 400626. | 3736184. | -32 |
| 8 | 8 | 2400 | 33.7936 | -118.0675 | 401178. | 3739781. | -25 |
| 9 | 9 | 2400 | 33.7936 | -118.0675 | 401178. | 3739781. | -25 |
| 10 | 10 | 2370 | 33.8225 | -118.0663 | 401320. | 3742988. | -22 |
| 11 | 11 | 2355 | 33.8358 | -118.0615 | 401785. | 3744459. | -19 |
| 12 | 12 | 2340 | 33.8496 | -118.0565 | 402261. | 3745985. | -19 |
| 13 | 13 | 2315 | 33.8659 | -118.0357 | 404207. | 3747772. | -16 |
| 14 | 14 | 2300 | 33.8800 | -118.0334 | 404435. | 3749333. | -18 |
| 15 | 15 | 2275 | 33.9081 | -118.0414 | 403727. | 3752452. | -5 |
| 16 | 16 | 2255 | 33.9260 | -118.0361 | 404231. | 3754437. | 2 |
| 17 | 17 | 2240 | 33.9377 | -118.0285 | 404949. | 3755720. | 15 |
| 18 | 18 | 2210 | 33.9614 | -118.0114 | 406556. | 3758336. | 71 |
| 19 | 19 | 2200 | 33.9695 | -118.0048 | 407175. | 3759229. | 127 |
| 20 | 20 | 2185 | 33.9839 | -118.0068 | 407001. | 3760830. | 277 |
| 21 | 21 | 2160 | 34.0112 | -118.0105 | 406690. | 3763853. | 297 |
| 22 | 22 | 2150 | 34.0182 | -118.0113 | 406630. | 3764635. | 285 |
| 23 | 23 | 2130 | 34.0353 | -117.9981 | 407861. | 3766518. | 86 |
| 24 | 24 | 2109 | 34.0508 | -117.9836 | 409219. | 3768229. | 67 |
| 25 | 25 | 2080 | 34.0724 | -117.9656 | 410905. | 3770609. | 72 |
| 26 | 26 | 2065 | 34.0831 | -117.9542 | 411962. | 3771782. | 84 |
| 27 | 27 | 2039 | 34.1097 | -117.9550 | 411923. | 3774736. | 105 |
| 28 | 28 | 2020 | 34.1256 | -117.9471 | 412669. | 3776485. | 131 |
| 29 | 29 | 2000 | 34.1400 | -117.9334 | 413941. | 3778078. | 158 |
| 30 | 30 | 20 | 34.1543 | -117.9189 | 415293. | 3779648. | 184 |
| 31 | 31 | 42 | 34.1661 | -117.8923 | 417759. | 3780931. | 256 |
| 32 | 32 | 60 | 34.1802 | -117.8817 | 418750. | 3782484. | 359 |
| 33 | 33 | 80 | 34.1934 | -117.8652 | 420281. | 3783934. | 340 |
| 34 | 34 | 80 | 34.1934 | -117.8652 | 420281. | 3783934. | 340 |
| 35 | 35 | 100 | 34.2126 | -117.8638 | 420425. | 3786063. | 468 |
| 36 | 36 | 118 | 34.2248 | -117.8496 | 421745. | 3787409. | 436 |
| 37 | 37 | 141 | 34.2515 | -117.8602 | 420798. | 3790380. | 539 |
| 38 | 38 | 156 | 34.2624 | -117.8448 | 422223. | 3791573. | 676 |
| 39 | 39 | 177 | 34.2830 | -117.8440 | 422318. | 3793856. | 917 |
| 40 | 40 | 198 | 34.3018 | -117.8385 | 422839. | 3795936. | 1173 |
| 41 | 41 | 219 | 34.3228 | -117.8380 | 422908. | 3798264. | 1690 |
| 42 | 42 | 235 | 34.3356 | -117.8327 | 423404. | 3799679. | 1922 |
| 43 | 43 | 259 | 34.3508 | -117.8089 | 425605. | 3801353. | 2278 |
| 44 | 44 | 277 | 34.3616 | -117.7906 | 427295. | 3802532. | 2273 |
| 45 | 45 | 297 | 34.3749 | -117.7725 | 428978. | 3803991. | 2095 |
| 46 | 46 | 323 | 34.3915 | -117.7475 | 431291. | 3805822. | 1905 |
| 47 | 47 | 342 | 34.4011 | -117.7244 | 433414. | 3806867. | 1879 |
| 48 | 48 | 360 | 34.4166 | -117.7171 | 434099. | 3808578. | 1501 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 49 | 49 | 378 | 34.4328 | -117.7123 | 434552. | 3810372. | 1378 |
| 50 | 50 | 400 | 34.4532 | -117.7107 | 434715. | 3812637. | 0 |
| 51 | 51 | 420 | 34.4753 | -117.7129 | 434538. | 3815093. | 1092 |
| 52 | 52 | 445 | 34.4957 | -117.7037 | 435390. | 3817349. | 1013 |
| 53 | 53 | 460 | 34.5092 | -117.6954 | 436170. | 3818838. | 978 |
| 54 | 54 | 480 | 34.5276 | -117.6905 | 436629. | 3820874. | 941 |
| 55 | 55 | 500 | 34.5421 | -117.6809 | 437518. | 3822474. | 916 |
| 56 | 56 | 515 | 34.5534 | -117.6603 | 439424. | 3823719. | 913 |
| 57 | 57 | 540 | 34.5730 | -117.6537 | 440039. | 3825889. | 889 |
| 58 | 58 | 560 | 34.5917 | -117.6485 | 440528. | 3827959. | 865 |
| 59 | 59 | 580 | 34.6045 | -117.6411 | 441222. | 3829376. | 856 |
| 60 | 60 | 600 | 34.6225 | -117.6335 | 441930. | 3831358. | 865 |
| 61 | 61 | 620 | 34.6387 | -117.6185 | 443311. | 3833148. | 833 |
| 62 | 62 | 650 | 34.6661 | -117.6145 | 443700. | 3836192. | 834 |
| 63 | 63 | 660 | 34.6759 | -117.6140 | 443750. | 3837277. | 843 |
| 64 | 64 | 680 | 34.6901 | -117.5966 | 445351. | 3838838. | 900 |
| 65 | 65 | 700 | 34.7101 | -117.5965 | 445373. | 3841053. | 987 |
| 66 | 66 | 720 | 34.7234 | -117.5804 | 446856. | 3842529. | 1037 |
| 67 | 67 | 740 | 34.7373 | -117.5660 | 448184. | 3844061. | 1224 |
| 68 | 68 | 770 | 34.7626 | -117.5430 | 450310. | 3846854. | 915 |
| 69 | 69 | 800 | 34.7855 | -117.5392 | 450668. | 3849392. | 839 |
| 70 | 70 | 820 | 34.7957 | -117.5169 | 452713. | 3850506. | 826 |
| 71 | 71 | 840 | 34.8166 | -117.5154 | 452866. | 3852824. | 806 |
| 72 | 72 | 860 | 34.8305 | -117.5005 | 454232. | 3854362. | 800 |
| 73 | 73 | 880 | 34.8522 | -117.5065 | 453696. | 3856773. | 813 |
| 74 | 74 | 900 | 34.8687 | -117.4918 | 455052. | 3858595. | 840 |
| 75 | 75 | 920 | 34.8888 | -117.4870 | 455504. | 3860820. | 894 |
| 76 | 76 | 940 | 34.9040 | -117.4841 | 455774. | 3862506. | 866 |
| 77 | 77 | 960 | 34.9177 | -117.4692 | 457141. | 3864014. | 811 |
| 78 | 78 | 980 | 34.9368 | -117.4544 | 458501. | 3866131. | 749 |
| 79 | 79 | 1000 | 34.9478 | -117.4433 | 459527. | 3867340. | 718 |
| 80 | 80 | 1020 | 34.9627 | -117.4270 | 461020. | 3868995. | 699 |
| 81 | 81 | 1040 | 34.9746 | -117.4111 | 462479. | 3870301. | 682 |
| 82 | 82 | 1060 | 34.9877 | -117.3911 | 464308. | 3871744. | 668 |
| 83 | 83 | 1080 | 34.9986 | -117.3743 | 465844. | 3872953. | 0 |
| 84 | 84 | 1100 | 35.0146 | -117.3656 | 466644. | 3874720. | 625 |
| 85 | 85 | 1120 | 35.0252 | -117.3344 | 469499. | 3875889. | 594 |
| 86 | 86 | 1140 | 35.0433 | -117.3306 | 469847. | 3877898. | 585 |

## TABLE E: Line 2 Locations: Northridge Locations - Lat/Long and UTM

Station Locations
World Geodetic Survey 1984 Reference Geoid

| Gather # in Line 1 | Cumulative gather# | Station Name | Lat(°N) | Long(°W) | UTM X (m) | UTM Y (m) | Altitude (m) |
|---|---|---|---|---|---|---|---|
| 1 | 87 | 7001 | 34.0420 | -118.5742 | 354688. | 3767934. | 19 |
| 2 | 88 | 7002 | 34.0595 | -118.5739 | 354751. | 3769867. | 435 |
| 3 | 89 | 7003 | 34.0789 | -118.5803 | 354190. | 3772033. | 446 |
| 4 | 90 | 7004 | 34.0983 | -118.5807 | 354183. | 3774180. | 462 |
| 5 | 91 | 7005 | 34.1095 | -118.5635 | 355797. | 3775397. | 599 |
| 6 | 92 | 7006 | 34.1324 | -118.5649 | 355700. | 3777941. | 452 |
| 7 | 93 | 7007 | 34.1471 | -118.5574 | 356422. | 3779562. | 274 |
| 8 | 94 | 7008 | 34.1628 | -118.5609 | 356123. | 3781311. | 266 |
| 9 | 95 | 7009 | 34.1800 | -118.5589 | 356337. | 3783208. | 205 |
| 10 | 96 | 7010 | 34.1967 | -118.5559 | 356642. | 3785061. | 199 |
| 11 | 97 | 7011 | 34.2149 | -118.5503 | 357191. | 3787069. | 197 |
| 12 | 98 | 7012 | 34.2387 | -118.5484 | 357407. | 3789708. | 230 |
| 13 | 99 | 7013 | 34.2602 | -118.5432 | 357923. | 3792082. | 274 |
| 14 | 100 | 7014 | 34.2759 | -118.5434 | 357931. | 3793823. | 343 |
| 15 | 101 | 7015 | 34.2966 | -118.5421 | 358084. | 3796118. | 441 |
| 16 | 102 | 7016 | 34.3170 | -118.5349 | 358782. | 3798373. | 775 |
| 17 | 103 | 7017 | 34.3283 | -118.5373 | 358573. | 3799624. | 733 |
| 18 | 104 | 7018 | 34.3503 | -118.5295 | 359330. | 3802063. | 538 |
| 19 | 105 | 7019 | 34.3675 | -118.5287 | 359436. | 3803969. | 443 |
| 20 | 106 | 7020 | 34.3818 | -118.5231 | 359968. | 3805539. | 373 |
| 21 | 107 | 7021 | 34.4060 | -118.5245 | 359882. | 3808226. | 397 |
| 22 | 108 | 7022 | 34.4312 | -118.5194 | 360393. | 3811019. | 356 |
| 23 | 109 | 7023 | 34.4604 | -118.5127 | 361056. | 3814246. | 402 |
| 24 | 110 | 7024 | 34.4732 | -118.5099 | 361333. | 3815664. | 406 |
| 25 | 111 | 7025 | 34.4964 | -118.5195 | 360495. | 3818242. | 552 |
| 26 | 112 | 7026 | 34.5207 | -118.5174 | 360726. | 3820940. | 621 |
| 27 | 113 | 7027 | 34.5447 | -118.4946 | 362857. | 3823568. | 684 |
| 28 | 114 | 7028 | 34.5638 | -118.4836 | 363895. | 3825675. | 535 |
| 29 | 115 | 7029 | 34.5928 | -118.4922 | 363155. | 3828900. | 914 |
| 30 | 116 | 7030 | 34.6050 | -118.4852 | 363817. | 3830241. | 1084 |
| 31 | 117 | 7031 | 34.6266 | -118.4592 | 366237. | 3832604. | 1181 |
| 32 | 118 | 7032 | 34.6543 | -118.4758 | 364762. | 3835695. | 882 |
| 33 | 119 | 7033 | 34.6731 | -118.4789 | 364513. | 3837790. | 1288 |
| 34 | 120 | 7034 | 34.6899 | -118.4821 | 364239. | 3839652. | 1046 |
| 35 | 121 | 7035 | 34.7221 | -118.4819 | 364312. | 3843223. | 1050 |
| 36 | 122 | 7036 | 34.7462 | -118.4780 | 364711. | 3845893. | 860 |
| 37 | 123 | 7037 | 34.7642 | -118.4668 | 365763. | 3847875. | 828 |
| 38 | 124 | 7038 | 34.7895 | -118.4667 | 365817. | 3850679. | 802 |
| 39 | 125 | 7039 | 34.8107 | -118.4674 | 365785. | 3853032. | 782 |
| 40 | 126 | 7040 | 34.8342 | -118.4669 | 365868. | 3855640. | 800 |
| 41 | 127 | 7041 | 34.8518 | -118.4457 | 367837. | 3857559. | 801 |
| 42 | 128 | 7042 | 34.8797 | -118.4505 | 367440. | 3860658. | 902 |
| 43 | 129 | 7043 | 34.9003 | -118.4551 | 367050. | 3862952. | 920 |
| 44 | 130 | 7044 | 34.9221 | -118.4535 | 367239. | 3865365. | 1008 |
| 45 | 131 | 7045 | 34.9432 | -118.4451 | 368038. | 3867697. | 1133 |
| 46 | 132 | 7046 | 34.9623 | -118.4412 | 368420. | 3869815. | 1307 |
| 47 | 133 | 7050 | 34.6967 | -118.4816 | 364299. | 3840407. | 1227 |

# TABLE F: Line 3: Los Angeles Basin CrossLine Locations - Lat/Long and UTM

Station Locations
World Geodetic Survey 1984 Reference Geoid

| Gather # in Line 1 | Cumulative gather# | Station Name | Lat(°N) | Long(°W) | UTM X (m) | UTM Y (m) | Altitude (m) |
|---|---|---|---|---|---|---|---|
| 1 | 134 | 6001 | 33.8378 | -118.3894 | 371445. | 3745041. | -16 |
| 2 | 135 | 6002 | 33.8428 | -118.3634 | 373855. | 3745559. | -8 |
| 3 | 136 | 6003 | 33.8473 | -118.3267 | 377264. | 3746018. | -10 |
| 4 | 137 | 6004 | 33.8545 | -118.2993 | 379803. | 3746779. | -12 |
| 5 | 138 | 6005 | 33.8571 | -118.2800 | 381595. | 3747053. | -27 |
| 6 | 139 | 6006 | 33.8617 | -118.2608 | 383377. | 3747540. | -10 |
| 7 | 140 | 6007 | 33.8677 | -118.2259 | 386616. | 3748168. | -4 |
| 8 | 141 | 6008 | 33.8746 | -118.2022 | 388815. | 3748902. | -13 |
| 9 | 142 | 6009 | 33.8808 | -118.1779 | 391071. | 3749563. | -17 |
| 10 | 143 | 6010 | 33.8920 | -118.1512 | 393556. | 3750773. | -10 |
| 11 | 144 | 6011 | 33.8936 | -118.1279 | 395709. | 3750935. | -12 |
| 12 | 145 | 6012 | 33.8944 | -118.0998 | 398305. | 3750993. | -5 |
| 13 | 146 | 6013 | 33.8940 | -118.0679 | 401261. | 3750912. | -8 |
| 14 | 147 | 6014 | 33.9076 | -118.0473 | 403179. | 3752407. | -3 |
| 15 | 148 | 6015 | 33.9092 | -118.0175 | 405930. | 3752559. | 16 |
| 16 | 149 | 6016 | 33.9158 | -117.9962 | 407906. | 3753262. | 44 |
| 17 | 150 | 6017 | 33.9231 | -117.9732 | 410046. | 3754061. | 55 |
| 18 | 151 | 6018 | 33.9282 | -117.9413 | 412996. | 3754595. | 54 |
| 19 | 152 | 6019 | 33.9299 | -117.9124 | 415676. | 3754757. | 75 |
| 20 | 153 | 6020 | 33.9408 | -117.8893 | 417815. | 3755946. | 87 |
| 21 | 154 | 6021 | 33.9454 | -117.8646 | 420106. | 3756433. | 273 |
| 22 | 155 | 6022 | 33.9520 | -117.8376 | 422602. | 3757151. | 172 |
| 23 | 156 | 6023 | 33.9560 | -117.8140 | 424788. | 3757575. | 385 |
| 24 | 157 | 6024 | 33.9637 | -117.7878 | 427218. | 3758411. | 371 |
| 25 | 158 | 6025 | 33.9673 | -117.7622 | 429584. | 3758796. | 346 |
| 26 | 159 | 6026 | 33.9748 | -117.7302 | 432546. | 3759602. | 225 |
| 27 | 160 | 6027 | 33.9740 | -117.7080 | 434594. | 3759499. | 176 |
| 28 | 161 | 6028 | 33.9829 | -117.6893 | 436331. | 3760473. | 150 |
| 29 | 162 | 6029 | 33.9902 | -117.6587 | 439162. | 3761259. | 168 |
| 30 | 163 | 6030 | 33.9941 | -117.6282 | 441984. | 3761682. | 175 |
| 31 | 164 | 6031 | 33.9975 | -117.6059 | 444041. | 3762039. | 180 |
| 32 | 165 | 6032 | 34.0063 | -117.5759 | 446824. | 3763007. | 197 |
| 33 | 166 | 6033 | 34.0114 | -117.5550 | 448753. | 3763556. | 203 |
| 34 | 167 | 6034 | 34.0147 | -117.5249 | 451535. | 3763915. | 204 |
| 35 | 168 | 6035 | 34.0242 | -117.5033 | 453533. | 3764951. | 282 |
| 36 | 169 | 6036 | 34.0265 | -117.4637 | 457188. | 3765186. | 277 |
| 37 | 170 | 6037 | 34.0371 | -117.4338 | 459956. | 3766355. | 345 |
| 38 | 171 | 6038 | 34.0400 | -117.4094 | 462211. | 3766668. | 274 |
| 39 | 172 | 6039 | 34.0435 | -117.3878 | 464210. | 3767050. | 254 |
| 40 | 173 | 6040 | 34.0474 | -117.3677 | 466063. | 3767468. | 260 |
| 41 | 174 | 6041 | 34.0537 | -117.3372 | 468878. | 3768157. | 247 |

## TABLE G. Land Line Station Naming Scheme

| | |
|---|---|
| 0000's | Line 1 (Seal-Beach to Barstow) |
| 1000's | " " |
| 2000's | " " |
| 3000's | Line 1 doubled up stations (add 3000 to original station) |
| 4000's | " " |
| 5000's | " " |
| 6000's | Line 3 (East-west Los Angeles basin) |
| 7000's | Line 2 (Northridge) |

**TABLE H: Instrument Inventory and Specifications**

| Reftek Type | # of Refteks | Internal GPS? | Owner[1] | CPU Bits | Internal Disk Size |
|---|---|---|---|---|---|
| 72A-02 | 8 | no GPS | SCEC | 16 | external |
| | 3 | no GPS | LANL | 16 | external |
| 72A-06 | 64 | no GPS | PASSCAL | 16 | 230 MB |
| | 1 | no GPS | UTEP | 16 | 230 MB |
| 72A-07 | 61 | no GPS | PASSCAL | 24 | 230 MB |
| | 9 | no GPS | UTEP | 24 | 230 MB |
| 72A-07/G | 28 | GPS int | PASSCAL | 24 | 1 GB |
| 72A-07G | 29 | GPS int | PASSCAL | 24 | 540 MB |
| 72A-08 | 10 | no GPS | SCEC | 24 | external |
| | 2 | no GPS | LANL | 24 | external |
| | === | | | | |
| TOTAL: | 215 | | | | |

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[1]
LANL Los Alamos National Laboratory
PASSCAL Incorporated Research Institutes for Seismology (IRIS) Program for Array Seismic Studies of the Crust and Lithosphere (PASSCAL)
SCEC Southern California Earthquake Center
UTEP University of Texas at El Paso

# TABLE J: Instrument Deployment History

*Instrument did not produce seismograms.

| Common receiv. gather number | Common station gather number | Stake number | Array number | Gather in array | Statn in array | Instrument Number During: Install | Visit one | Visit two | Pickup |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 4004 | 1 | 1 | 1 | 7291 | 7291 | 7291 | 7291 |
| 2 | 2 | 4003 | 1 | 2 | 2 | 7290 | 7290 | 7290 | 7290 |
| 3 | 3 | 4002 | 1 | 3 | 3 | 7287 | 7287 | 7287 | 7287 |
| 4 | 4 | 4001 | 1 | 4 | 4 | 7286 | 7286 | 7286 | 7286 |
| 5 | 5 | 2455 | 1 | 5 | 5 | 695 | 695 | 695 | 695 |
| 6 | 6 | 2445 | 1 | 6 | 6 | 696 | 696 | 696 | 696 |
| 7 | 7 | 2435 | 1 | 7 | 7 | 631 | 631 | 631 | 631 |
| 8 | 8 | 2400 | 1 | 8 | 8 | 7045 | 7045 | 7045 | 7045 |
| 9 | 8 | 2400 | 1 | 9 | 8 | 629 | 629 | 629 | 629 |
| 10 | 9 | 2370 | 1 | 10 | 9 | 7057 | 7057 | 7057 | 7057 |
| 11 | 10 | 2355 | 1 | 11 | 10 | 7280* | 7280* | 7280* | 7280* |
| 12 | 11 | 2340 | 1 | 12 | 11 | 7282 | 7282 | 7282 | 7282 |
| 13 | 12 | 2315 | 1 | 13 | 12 | 7283 | 7283 | 7283 | 7283 |
| 14 | 13 | 2300 | 1 | 14 | 13 | 7285 | 7285 | 7285 | 7285 |
| 15 | 14 | 2275 | 1 | 15 | 14 | 7292 | 0 | 0 | 0 |
| 15 | 14 | 2275 | 1 | 15 | 14 | 0 | 7296* | 7296* | 7296* |
| 16 | 15 | 2255 | 1 | 16 | 15 | 7293* | 7293* | 0 | 0 |
| 16 | 15 | 2255 | 1 | 16 | 15 | 0 | 0 | 7089 | 7089 |
| 17 | 16 | 2240 | 1 | 17 | 16 | 7295 | 7295 | 7295 | 7295 |
| 18 | 17 | 2210 | 1 | 18 | 17 | 7297 | 7297 | 7297 | 7297 |
| 19 | 18 | 2200 | 1 | 19 | 18 | 7299 | 7299 | 7299 | 7299 |
| 20 | 19 | 2185 | 1 | 20 | 19 | 7303 | 7303 | 7303 | 7303 |
| 21 | 20 | 2160 | 1 | 21 | 20 | 7304 | 7304 | 7304 | 7304 |
| 22 | 21 | 2150 | 1 | 22 | 21 | 7316 | 7316 | 7316 | 7316 |
| 23 | 22 | 2130 | 1 | 23 | 22 | 7278 | 7278 | 7278 | 7278 |
| 24 | 23 | 2109 | 1 | 24 | 23 | 7352* | 7352* | 7352* | 7352* |
| 25 | 24 | 2080 | 1 | 25 | 24 | 7354 | 7354 | 7354 | 7354 |
| 26 | 25 | 2065 | 1 | 26 | 25 | 7356 | 7356 | 7356 | 7356 |
| 27 | 26 | 2039 | 1 | 27 | 26 | 6065 | 6065 | 6065 | 6065 |
| 28 | 27 | 2020 | 1 | 28 | 27 | 7065 | 7065 | 7065 | 7065 |
| 29 | 28 | 2000 | 1 | 29 | 28 | 7093 | 7093 | 7093 | 7093 |
| 30 | 29 | 20 | 1 | 30 | 29 | 7094 | 7094 | 0 | 0 |
| 30 | 29 | 20 | 1 | 30 | 29 | 0 | 0 | 7103 | 7103 |
| 31 | 30 | 42 | 1 | 31 | 30 | 7099 | 7099 | 7099 | 7099 |
| 32 | 31 | 60 | 1 | 32 | 31 | 7305 | 7305 | 7305 | 7305 |
| 33 | 32 | 80 | 1 | 33 | 32 | 7306 | 7306 | 7306 | 7306 |
| 34 | 32 | 80 | 1 | 34 | 32 | 0 |  | 500 | 500 |
| 35 | 33 | 100 | 1 | 35 | 33 | 7318 | 7318 | 7318 | 7318 |
| 36 | 34 | 118 | 1 | 36 | 34 | 7320 | 7320 | 7320 | 7320 |
| 37 | 35 | 141 | 1 | 37 | 35 | 7325 | 7325 | 7325 | 7325 |
| 38 | 36 | 156 | 1 | 38 | 36 | 7332 | 7332 | 7332 | 7332 |
| 39 | 37 | 177 | 1 | 39 | 37 | 7333 | 7333 | 7333 | 7333 |
| 40 | 38 | 198 | 1 | 40 | 38 | 7348 | 7348 | 7348 | 7348 |
| 41 | 39 | 219 | 1 | 41 | 39 | 7336 | 7336 | 7336 | 7336 |
| 42 | 40 | 235 | 1 | 42 | 40 | 7341 | 7341 | 7341 | 7341 |

| Common receiv. gather number | Common station gather number | Stake number | Array number | Gather in array | Statn in array | Instrument Number During: Install | Visit one | Visit two | Pickup |
|---|---|---|---|---|---|---|---|---|---|
| 43 | 41 | 259 | 1 | 43 | 41 | 7343 | 7343 | 7343 | 7343 |
| 44 | 42 | 277 | 1 | 44 | 42 | 7344 | 7344 | 7344 | 7344 |
| 45 | 43 | 297 | 1 | 45 | 43 | 7346 | 7346 | 7346 | 7346 |
| 46 | 44 | 323 | 1 | 46 | 44 | 7347 | 7347 | 7347 | 7347 |
| 47 | 45 | 342 | 1 | 47 | 45 | 7349 | 7349 | 7349 | 7349 |
| 48 | 46 | 360 | 1 | 48 | 46 | 7350 | 7350 | 7350 | 7350 |
| 49 | 47 | 378 | 1 | 49 | 47 | 7351 | 7351 | 7351 | 7351 |
| 50 | 48 | 400 | 1 | 50 | 48 | 6003 | 6003 | 6003 | 6003 |
| 51 | 49 | 420 | 1 | 51 | 49 | 6020 | 6020 | 6020 | 6020 |
| 52 | 50 | 445 | 1 | 52 | 50 | 6021 | 6021 | 6021 | 6021 |
| 53 | 51 | 460 | 1 | 53 | 51 | 6022 | 6022 | 6022 | 6022 |
| 54 | 52 | 480 | 1 | 54 | 52 | 6024 | 6024 | 6024 | 6024 |
| 55 | 53 | 500 | 1 | 55 | 53 | 6025 | 6025 | 6025 | 6025 |
| 56 | 54 | 515 | 1 | 56 | 54 | 6026 | 6026 | 6026 | 6026 |
| 57 | 55 | 540 | 1 | 57 | 55 | 6027 | 6027 | 6027 | 6027 |
| 58 | 56 | 560 | 1 | 58 | 56 | 6028 | 6028 | 6028 | 6028 |
| 59 | 57 | 580 | 1 | 59 | 57 | 6031 | 6031 | 6031 | 6031 |
| 60 | 58 | 600 | 1 | 60 | 58 | 6032 | 6032 | 6032 | 6032 |
| 61 | 59 | 620 | 1 | 61 | 59 | 6035 | 6035 | 6035 | 6035 |
| 62 | 60 | 650 | 1 | 62 | 60 | 6037 | 6037 | 6037 | 6037 |
| 63 | 61 | 660 | 1 | 63 | 61 | 6038 | 6038 | 6038 | 6038 |
| 64 | 62 | 680 | 1 | 64 | 62 | 6039 | 6039 | 6039 | 6039 |
| 65 | 63 | 700 | 1 | 65 | 63 | 6040 | 6040 | 6040 | 6040 |
| 66 | 64 | 720 | 1 | 66 | 64 | 6042* | 6042* | 6042* | 6042* |
| 67 | 65 | 740 | 1 | 67 | 65 | 6045 | 6045 | 6045 | 6045 |
| 68 | 66 | 770 | 1 | 68 | 66 | 6046 | 6046 | 6046 | 6046 |
| 69 | 67 | 800 | 1 | 69 | 67 | 6048 | 6048 | 6048 | 6048 |
| 70 | 68 | 820 | 1 | 70 | 68 | 6049 | 6049 | 6049 | 6049 |
| 71 | 69 | 840 | 1 | 71 | 69 | 6050 | 6050 | 6050 | 6050 |
| 72 | 70 | 860 | 1 | 72 | 70 | 6051 | 6051 | 6051 | 6051 |
| 73 | 71 | 880 | 1 | 73 | 71 | 6111 | 6111 | 6111 | 6111 |
| 74 | 72 | 900 | 1 | 74 | 72 | 6112 | 6112 | 6112 | 6112 |
| 75 | 73 | 920 | 1 | 75 | 73 | 6056 | 6056 | 0 | 0 |
| 75 | 73 | 920 | 1 | 75 | 73 | 0 | 0 | 6060 | 6060 |
| 76 | 74 | 940 | 1 | 76 | 74 | 6057 | 6057 | 6057 | 6057 |
| 77 | 75 | 960 | 1 | 77 | 75 | 7108 | 7108 | 7108 | 7108 |
| 78 | 76 | 980 | 1 | 78 | 76 | 7110 | 7110 | 7110 | 7110 |
| 79 | 77 | 1000 | 1 | 79 | 77 | 7091 | 7091 | 7091 | 7091 |
| 80 | 78 | 1020 | 1 | 80 | 78 | 6071 | 6071 | 6071 | 6071 |
| 81 | 79 | 1040 | 1 | 81 | 79 | 6081 | 6081 | 6081 | 6081 |
| 82 | 80 | 1060 | 1 | 82 | 80 | 6083 | 6083 | 6083 | 6083 |
| 83 | 81 | 1080 | 1 | 83 | 81 | 6084 | 6084 | 6084 | 6084 |
| 84 | 82 | 1100 | 1 | 84 | 82 | 7355 | 7355 | 7355 | 7355 |
| 85 | 83 | 1120 | 1 | 85 | 83 | 7364 | 7364 | 7364 | 7364 |
| 86 | 84 | 1140 | 1 | 86 | 84 | 6088 | 6088 | 6088 | 6088 |
| 87 | 85 | 7001 | 2 | 1 | 1 | 7298 | 7298 | 7298 | 7295 |
| 88 | 86 | 7002 | 2 | 2 | 2 | 7357 | 7357 | 7357 | 7357 |
| 89 | 87 | 7003 | 2 | 3 | 3 | 7358 | 7358 | 7358 | 7358 |
| 90 | 88 | 7004 | 2 | 4 | 4 | 7362 | 7362 | 7362 | 7362 |
| 91 | 89 | 7005 | 2 | 5 | 5 | 7365 | 7365 | 7365 | 7365 |

| Common receiv. gather number | Common station gather number | Stake number | Array number | Gather in array | Statn in array | Instrument Number During: Install | Visit one | Visit two | Pickup |
|---|---|---|---|---|---|---|---|---|---|
| 92 | 90 | 7006 | 2 | 6 | 6 | 7112 | 7112 | 7112 | 7112 |
| 93 | 91 | 7007 | 2 | 7 | 7 | 7113 | 7113 | 7113 | 7113 |
| 94 | 92 | 7008 | 2 | 8 | 8 | 7114 | 7114 | 7114 | 7114 |
| 95 | 93 | 7009 | 2 | 9 | 9 | 7116 | 7116 | 7116 | 7116 |
| 96 | 94 | 7010 | 2 | 10 | 10 | 7079 | 7079 | 7079 | 7079 |
| 97 | 95 | 7011 | 2 | 11 | 11 | 7080 | 7080 | 7080 | 7080 |
| 98 | 96 | 7012 | 2 | 12 | 12 | 7081 | 7081 | 7081 | 7081 |
| 99 | 97 | 7013 | 2 | 13 | 13 | 7084 | 7084 | 7084 | 7084 |
| 100 | 98 | 7014 | 2 | 14 | 14 | 7107 | 7107 | 7107 | 7107 |
| 101 | 99 | 7015 | 2 | 15 | 15 | 7100 | 7100 | 7100 | 7100 |
| 102 | 100 | 7016 | 2 | 16 | 16 | 7277* | 7277* | 7277* | 7277* |
| 103 | 101 | 7017 | 2 | 17 | 17 | 7279 | 7279 | 7279 | 7279 |
| 104 | 102 | 7018 | 2 | 18 | 18 | 7281 | 7281 | 7281 | 7281 |
| 105 | 103 | 7019 | 2 | 19 | 19 | 7289 | 7289 | 7289 | 7289 |
| 106 | 104 | 7020 | 2 | 20 | 20 | 7101 | 7101 | 7101 | 7101 |
| 107 | 105 | 7021 | 2 | 21 | 21 | 7087 | 7087 | 7087 | 7087 |
| 108 | 106 | 7022 | 2 | 22 | 22 | 7296* | 0 | 0 | 0 |
| 108 | 106 | 7022 | 2 | 22 | 22 | 0 | 7038 | 7038 | 7038 |
| 109 | 107 | 7023 | 2 | 23 | 23 | 7300 | 7300 | 7300 | 7300 |
| 110 | 108 | 7024 | 2 | 24 | 24 | 7301 | 7301 | 7301 | 7301 |
| 111 | 109 | 7025 | 2 | 25 | 25 | 7302 | 7302 | 7302 | 7302 |
| 112 | 110 | 7026 | 2 | 26 | 26 | 7042 | 7042 | 7042 | 7042 |
| 113 | 111 | 7027 | 2 | 27 | 27 | 7321 | 7321 | 7321 | 7321 |
| 114 | 112 | 7028 | 2 | 28 | 28 | 7088 | 7088 | 7088 | 7088 |
| 115 | 113 | 7029 | 2 | 29 | 29 | 7106 | 7106 | 0 | 0 |
| 115 | 113 | 7029 | 2 | 29 | 29 | 0 | 7078 | 7078 | 7078 |
| 116 | 114 | 7030 | 2 | 30 | 30 | 7294 | 7294 | 7294 | 7294 |
| 117 | 115 | 7031 | 2 | 31 | 31 | 7322 | 7322 | 7322 | 7322 |
| 118 | 116 | 7032 | 2 | 32 | 32 | 7095 | 7095 | 7095 | 7095 |
| 119 | 117 | 7033 | 2 | 33 | 33 | 7102 | 7102 | 7102 | 7102 |
| 120 | 118 | 7034 | 2 | 34 | 34 | 7104 | 7104 | 7104 | 7104 |
| 121 | 119 | 7035 | 2 | 35 | 35 | 6092 | 6092 | 6092 | 6092 |
| 122 | 120 | 7036 | 2 | 36 | 36 | 6091 | 6091 | 6091 | 6091 |
| 123 | 121 | 7037 | 2 | 37 | 37 | 6095 | 6095 | 6095 | 6095 |
| 124 | 122 | 7038 | 2 | 38 | 38 | 6096 | 6096 | 6096 | 6094 |
| 125 | 123 | 7039 | 2 | 39 | 39 | 6097 | 6097 | 6097 | 6097 |
| 126 | 124 | 7040 | 2 | 40 | 40 | 6099 | 6099 | 6099 | 6099 |
| 127 | 125 | 7041 | 2 | 41 | 41 | 6100 | 6100 | 6100 | 6100 |
| 128 | 126 | 7042 | 2 | 42 | 42 | 6101 | 6101 | 6101 | 6101 |
| 129 | 127 | 7043 | 2 | 43 | 43 | 6102 | 6102 | 6102 | 6102 |
| 130 | 128 | 7044 | 2 | 44 | 44 | 6107 | 6107 | 6107 | 6107 |
| 131 | 129 | 7045 | 2 | 45 | 45 | 6108 | 6108 | 6108 | 6108 |
| 132 | 130 | 7046 | 2 | 46 | 46 | 6109 | 6109 | 6109 | 6109 |
| 133 | 131 | 7050 | 2 | 47 | 47 | 0 | 7077 | 7077 | 7077 |
| 134 | 132 | 6001 | 3 | 1 | 1 | 7039 | 7039 | 7039 | 7039 |
| 135 | 133 | 6002 | 3 | 2 | 2 | 7040 | 7040 | 7040 | 7040 |
| 136 | 134 | 6003 | 3 | 3 | 3 | 7041 | 7041 | 7041 | 7041 |
| 137 | 135 | 6004 | 3 | 4 | 4 | 7046 | 7046 | 7046 | 7046 |
| 138 | 136 | 6005 | 3 | 5 | 5 | 7047 | 7047 | 7047 | 7047 |
| 139 | 137 | 6006 | 3 | 6 | 6 | 7048 | 7048 | 7048 | 7048 |
| 140 | 138 | 6007 | 3 | 7 | 7 | 7049 | 7049 | 7049 | 7049 |

| Common receiv. gather number | Common station gather number | Stake number | Array number | Gather in array | Statn in array | Instrument Number During: Install | Visit one | Visit two | Pickup |
|---|---|---|---|---|---|---|---|---|---|
| 141 | 139 | 6008 | 3 | 8 | 8 | 7085 | 7085 | 7085 | 7085 |
| 142 | 140 | 6009 | 3 | 9 | 9 | 7050 | 7050 | 7050 | 7054 |
| 143 | 141 | 6010 | 3 | 10 | 10 | 7051 | 7051 | 7051 | 7050 |
| 144 | 142 | 6011 | 3 | 11 | 11 | 7052 | 7052 | 7052 | 7052 |
| 145 | 143 | 6012 | 3 | 12 | 12 | 7053 | 7053 | 7053 | 7053 |
| 146 | 144 | 6013 | 3 | 13 | 13 | 7054 | 7054 | 7054 | 7056 |
| 147 | 145 | 6014 | 3 | 14 | 14 | 7056 | 7056 | 7056 | 7056 |
| 148 | 146 | 6015 | 3 | 15 | 15 | 7059 | 7059 | 7059 | 7059 |
| 149 | 147 | 6016 | 3 | 16 | 16 | 7061 | 7061 | 7061 | 7061 |
| 150 | 148 | 6017 | 3 | 17 | 17 | 7064 | 7064 | 7064 | 7064 |
| 151 | 149 | 6018 | 3 | 18 | 18 | 7076 | 7076 | 7076 | 7076 |
| 152 | 150 | 6019 | 3 | 19 | 19 | 7066 | 7066 | 7066 | 7066 |
| 153 | 151 | 6020 | 3 | 20 | 20 | 7068 | 7068 | 7068 | 7068 |
| 154 | 152 | 6021 | 3 | 21 | 21 | 7072 | 7072 | 7072 | 7072 |
| 155 | 153 | 6022 | 3 | 22 | 22 | 7073 | 7073 | 7073 | 7073 |
| 156 | 154 | 6023 | 3 | 23 | 23 | 7074 | 7074 | 7074 | 7074 |
| 157 | 155 | 6024 | 3 | 24 | 24 | 7075 | 7075 | 7075 | 7075 |
| 158 | 156 | 6025 | 3 | 25 | 25 | 6114 | 6114 | 6114 | 6114 |
| 159 | 157 | 6026 | 3 | 26 | 26 | 6115 | 6115 | 6115 | 6115 |
| 160 | 158 | 6027 | 3 | 27 | 27 | 6116 | 6116 | 6116 | 6116 |
| 161 | 159 | 6028 | 3 | 28 | 28 | 6118 | 6118 | 6118 | 6118 |
| 162 | 160 | 6029 | 3 | 29 | 29 | 6120 | 6120 | 6120 | 6120 |
| 163 | 161 | 6030 | 3 | 30 | 30 | 6124 | 6124 | 6124 | 6124 |
| 164 | 162 | 6031 | 3 | 31 | 31 | 6125 | 6125 | 6125 | 6125 |
| 165 | 163 | 6032 | 3 | 32 | 32 | 6127* | 6127* | 6127* | 6127* |
| 166 | 164 | 6033 | 3 | 33 | 33 | 6128 | 6128 | 6128 | 6128 |
| 167 | 165 | 6034 | 3 | 34 | 34 | 6129 | 6129 | 6129 | 6129 |
| 168 | 166 | 6035 | 3 | 35 | 35 | 6130 | 6130 | 6130 | 6130 |
| 169 | 167 | 6036 | 3 | 36 | 36 | 6131 | 6131 | 6131 | 6131 |
| 170 | 168 | 6037 | 3 | 37 | 37 | 6132 | 6132 | 6132 | 6132 |
| 171 | 169 | 6038 | 3 | 38 | 38 | 6134 | 6134 | 6134 | 6134 |
| 172 | 170 | 6039 | 3 | 39 | 39 | 6121 | 6121 | 6121 | 6121 |
| 173 | 171 | 6040 | 3 | 40 | 40 | 630 | 630 | 630 | 630 |
| 174 | 172 | 6041 | 3 | 41 | 41 | 593 | 593 | 593 | 593 |

Notes:

Exabyte tapes for box 7280 (stn. 2355, Line 1) not available.

Box 7293 (stn. 2255, Line 1) was stolen from the golf course and was replaced by box 7089.

Box 6042 (stn. 720, Line 1) was dead, no data available.

Box 7277 (stn. 7016, Line 2) was dead, no data available.

Box 7296 (stn. 7022, Line 2) was moved to stn. 2275 (Line 1) later.

Box 6127 (stn. 6032, Line 3) was dead, no data available.

## TABLE K: Technical Description of Data Reduction Flow

step procedure [programs in square brackets; see list below]
---- ----------

0 start w/ original field data tapes (Reftek Data Acquisition System (DAS) format).

1 read field tapes to disk, converting from Reftek DAS format to IRIS SEG-Y trace file format. [PASSCAL's "ref2segy" program].

2 Determine DAS clock drift history. [PASSCAL's "clockrate"]. Visually inspect the DAS clock history for each DAS. [PASSCAL's "clockview"].

3 Perform clock drift correction. [USC modification of PASSCAL's "clockcor"]. USC saves the clock correction value in a header while the PASSCAL version does not.

4 Remove Reftek amplitude DC shift from each SEG-Y trace file. [USC wrote a program to do this efficiently and to store the debias value in a trace header].

FOR EACH RECEIVER STATION:
START PIPE FLOW:
[All USC software below were written in a generalized manner in order to be used by other experiments. Also, the software is constructed to use UNIX pipe flow in order to minimize disk I/O.]

5 Extract seismograms out of SEG-Y trace files; each original trace consists of back-to-back 10-minute-long files. Seismograms are output in true-SEG-Y format. [USC modified PASSCAL's "segygather" not to write the source depth into its official SEG-Y trace header as the DEBIAS value from Step 4 above was stored there.

6 Convert source and receiver lat/long into UTM. Trace header lat/longs are used to calculate UTMs; these are stored as additional trace headers. [USC wrote the program to do this].

7 Perform linear moveout (reduced traveltime) correction. Store correction value in trace headers. [USC wrote the program to do this].

8 Modify SEG-Y trace headers so that the entire series of CRG's will form a proper SEG-Y data set when merged during Step 9. Also fill in fields describing data/experiment and also set trace indexing values. See Table N for SEG-Y definition for LARSE data.

END PIPE FLOW: Output is a single huge SEG-Y disk file containing the common receiver gather (CRG) seismograms for all 22,128 Ewing air-gun shots collected at the station.

9 For every 7 CRG's, read the disk files and write the seismograms to tape using LARSE SEG-Y tape format (Table N). 25 tapes are needed to archive the 174 CRG's. [USC wrote the program which will read the 7 disk files and create the exabyte SEG-Y tapes].

10 Using the same 7 CRG disk files, read the files and write intermediate tapes which will be read at the IRIS Data Management Center (DMC) where the data (Product 1) will be resorted into a more usable form (Product 2). At the DMC, the data are sorted by ship track (Table A) using these intermediate tapes. [USC wrote the program which reads the 7 disk files and creates the intermediate tapes].

LIST OF PROGRAMS

| | | |
|---|---|---|
| ref2segy | [IRIS] | Translates data from Reftek DAS format to IRIS SEG-Y. |
| clockrate | [IRIS] | Determines DAS clock drift history. |
| clockview | [IRIS] | Displays clock drift history. |
| usc_clockcor | [IRIS/USC] | Performs clock drift correction. |
| usc_debias | [USC] | Removes DC mean from Reftek data. |
| *pipe | | |
| usc_segygather | [IRIS/USC] | Creates air-gun seismograms. |
| usc_utm | [USC] | Computes source/receiver UTM from lat/long. |
| usc_lmo | [USC] | Performs linear moveout (reduced traveltime) shift. |
| usc_segyhdrfix | [USC] | Fixes trace headers (see Table N) |
| *end of pipe | | |
| usc_segyjoin | [USC] | Places 7 LARSE common receiver gathers onto 1 exabyte tape in true SEG-Y format (Product 1). |
| usc_segylinemux | [USC] | Places 7 LARSE common receiver gathers onto 1 exabyte tape for sorting at IRIS-DMC. |

Auxilliary Programs For Quality Control

| | | |
|---|---|---|
| true2sierra | [USC] | Converts "segygather" output files ("true" SEG-Y format into SierraSeis-compatible SEG-Y format. |
| usc_ewing2segygather | [USC] | Converts the Ewing shot time text file into the format needed by "segygather". |
| usc_makegeomfiles | [USC] | Creates a station/DAS file for all stations as needed by "segygather" (run just once). |
| usc_segydump | [USC] | Prints selected IRIS-SEG-Y trace header values and reel headers from a true SEG-Y disk file (for verification that "segygather" worked). |
| usc_segylook | [USC] | Prints selected LARSE-SEG-Y trace header values and reel headers from a true SEG-Y disk file (for verification that the pipe flow worked). |
| usc_tapelook | [USC] | Prints selected SEG-Y trace headers from an exabyte tape (to verify that the final Product 1 archive tapes are OK). |
| usc_segywindow | [USC] | Extracts one ship line of data out of the entire common receiver gather to be used by SierraSeis for plotting (for verification that the reduced velocity was applied correctly). |

# TABLE L: Description of Product One

**PRODUCT 1: ARCHIVE TAPES**

Each CRG is 22,128 traces x 30 sec/trace x 100 samples/sec = 270 mb.
174 gathers @ 7 gathers/tape -> 25 SEG-Y tapes (8 mm).
Each trace is in reduced travel time (Vreduce = 6.0 km/sec) with the first data sample at -5.0 sec and the last data sample at 25.0 sec.

Line: 1 = Seal Beach - Mojave
2 = Malibu - Northridge - west Mojave
3 = east-west Los Angeles basin

| Tape | Gather # | Station # | Line | Stn | Gath in line | Stat in line | Tape | Gather # | Station # | Line | Stn | Gath in line | Stat in line |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 4004 | 1 | 1 | 6 | 36 | 34 | 1 | 118 | 36 | 34 |
| | 2 | 2 | 1 | 4003 | 2 | 2 | | 37 | 35 | 1 | 141 | 37 | 35 |
| | 3 | 3 | 1 | 4002 | 3 | 3 | | 38 | 36 | 1 | 156 | 38 | 36 |
| | 4 | 4 | 1 | 4001 | 4 | 4 | | 39 | 37 | 1 | 177 | 39 | 37 |
| | 5 | 5 | 1 | 2455 | 5 | 5 | | 40 | 38 | 1 | 198 | 40 | 38 |
| | 6 | 6 | 1 | 2445 | 6 | 6 | | 41 | 39 | 1 | 219 | 41 | 39 |
| | 7 | 7 | 1 | 2435 | 7 | 7 | | 42 | 40 | 1 | 235 | 42 | 40 |
| 2 | 8 | 8 | 1 | 2400 | 8 | 8 | 7 | 43 | 41 | 1 | 259 | 43 | 41 |
| | 9 | 8 | 1 | 2400 | 9 | 8 | | 44 | 42 | 1 | 277 | 44 | 42 |
| | 10 | 9 | 1 | 2370 | 10 | 9 | | 45 | 43 | 1 | 297 | 45 | 43 |
| | 11 | 10 | 1 | 2355 | 11 | 10 | | 46 | 44 | 1 | 323 | 46 | 44 |
| | 12 | 11 | 1 | 2340 | 12 | 11 | | 47 | 45 | 1 | 342 | 47 | 45 |
| | 13 | 12 | 1 | 2315 | 13 | 12 | | 48 | 46 | 1 | 360 | 48 | 46 |
| | 14 | 13 | 1 | 2300 | 14 | 13 | | 49 | 47 | 1 | 378 | 49 | 47 |
| 3 | 15 | 14 | 1 | 2275 | 15 | 14 | 8 | 50 | 48 | 1 | 400 | 50 | 48 |
| | 16 | 15 | 1 | 2255 | 16 | 15 | | 51 | 49 | 1 | 420 | 51 | 49 |
| | 17 | 16 | 1 | 2240 | 17 | 16 | | 52 | 50 | 1 | 445 | 52 | 50 |
| | 18 | 17 | 1 | 2210 | 18 | 17 | | 53 | 51 | 1 | 460 | 53 | 51 |
| | 19 | 18 | 1 | 2200 | 19 | 18 | | 54 | 52 | 1 | 480 | 54 | 52 |
| | 20 | 19 | 1 | 2185 | 20 | 19 | | 55 | 53 | 1 | 500 | 55 | 53 |
| | 21 | 20 | 1 | 2160 | 21 | 20 | | 56 | 54 | 1 | 515 | 56 | 54 |
| 4 | 22 | 21 | 1 | 2150 | 22 | 21 | 9 | 57 | 55 | 1 | 540 | 57 | 55 |
| | 23 | 22 | 1 | 2130 | 23 | 22 | | 58 | 56 | 1 | 560 | 58 | 56 |
| | 24 | 23 | 1 | 2109 | 24 | 23 | | 59 | 57 | 1 | 580 | 59 | 57 |
| | 25 | 24 | 1 | 2080 | 25 | 24 | | 60 | 58 | 1 | 600 | 60 | 58 |
| | 26 | 25 | 1 | 2065 | 26 | 25 | | 61 | 59 | 1 | 620 | 61 | 59 |
| | 27 | 26 | 1 | 2039 | 27 | 26 | | 62 | 60 | 1 | 650 | 62 | 60 |
| | 28 | 27 | 1 | 2020 | 28 | 27 | | 63 | 61 | 1 | 660 | 63 | 61 |
| 5 | 29 | 28 | 1 | 2000 | 29 | 28 | 10 | 64 | 62 | 1 | 680 | 64 | 62 |
| | 30 | 29 | 1 | 20 | 30 | 29 | | 65 | 63 | 1 | 700 | 65 | 63 |
| | 31 | 30 | 1 | 42 | 31 | 30 | | 66 | 64 | 1 | 720 | 66 | 64 |
| | 32 | 31 | 1 | 60 | 32 | 31 | | 67 | 65 | 1 | 740 | 67 | 65 |
| | 33 | 32 | 1 | 80 | 33 | 32 | | 68 | 66 | 1 | 770 | 68 | 66 |
| | 34 | 32 | 1 | 80 | 34 | 32 | | 69 | 67 | 1 | 800 | 69 | 67 |
| | 35 | 33 | 1 | 100 | 35 | 33 | | 70 | 68 | 1 | 820 | 70 | 68 |

| Tape | Gather # | Station # | Line | Stn | Gath in line | Stat in line |
|---|---|---|---|---|---|---|
| 11 | 71 | 69 | 1 | 840 | 71 | 69 |
| | 72 | 70 | 1 | 860 | 72 | 70 |
| | 73 | 71 | 1 | 880 | 73 | 71 |
| | 74 | 72 | 1 | 900 | 74 | 72 |
| | 75 | 73 | 1 | 920 | 75 | 73 |
| | 76 | 74 | 1 | 940 | 76 | 74 |
| | 77 | 75 | 1 | 960 | 77 | 75 |
| 12 | 78 | 76 | 1 | 980 | 78 | 76 |
| | 79 | 77 | 1 | 1000 | 79 | 77 |
| | 80 | 78 | 1 | 1020 | 80 | 78 |
| | 81 | 79 | 1 | 1040 | 81 | 79 |
| | 82 | 80 | 1 | 1060 | 82 | 80 |
| | 83 | 81 | 1 | 1080 | 83 | 81 |
| | 84 | 82 | 1 | 1100 | 84 | 82 |
| 13 | 85 | 83 | 1 | 1120 | 85 | 83 |
| | 86 | 84 | 1 | 1140 | 86 | 84 |
| | 87 | 85 | 2 | 7001 | 1 | 1 |
| | 88 | 86 | 2 | 7002 | 2 | 2 |
| | 89 | 87 | 2 | 7003 | 3 | 3 |
| | 90 | 88 | 2 | 7004 | 4 | 4 |
| | 91 | 89 | 2 | 7005 | 5 | 5 |
| 14 | 92 | 90 | 2 | 7006 | 6 | 6 |
| | 93 | 91 | 2 | 7007 | 7 | 7 |
| | 94 | 92 | 2 | 7008 | 8 | 8 |
| | 95 | 93 | 2 | 7009 | 9 | 9 |
| | 96 | 94 | 2 | 7010 | 10 | 10 |
| | 97 | 95 | 2 | 7011 | 11 | 11 |
| | 98 | 96 | 2 | 7012 | 12 | 12 |
| 15 | 99 | 97 | 2 | 7013 | 13 | 13 |
| | 100 | 98 | 2 | 7014 | 14 | 14 |
| | 101 | 99 | 2 | 7015 | 15 | 15 |
| | 102 | 100 | 2 | 7016 | 16 | 16 |
| | 103 | 101 | 2 | 7017 | 17 | 17 |
| | 104 | 102 | 2 | 7018 | 18 | 18 |
| | 105 | 103 | 2 | 7019 | 19 | 19 |
| 16 | 106 | 104 | 2 | 7020 | 20 | 20 |
| | 107 | 105 | 2 | 7021 | 21 | 21 |
| | 108 | 106 | 2 | 7022 | 22 | 22 |
| | 109 | 107 | 2 | 7023 | 23 | 23 |
| | 110 | 108 | 2 | 7024 | 24 | 24 |
| | 111 | 109 | 2 | 7025 | 25 | 25 |
| | 112 | 110 | 2 | 7026 | 26 | 26 |
| 17 | 113 | 111 | 2 | 7027 | 27 | 27 |
| | 114 | 112 | 2 | 7028 | 28 | 28 |
| | 115 | 113 | 2 | 7029 | 29 | 29 |
| | 116 | 114 | 2 | 7030 | 30 | 30 |
| | 117 | 115 | 2 | 7031 | 31 | 31 |
| | 118 | 116 | 2 | 7032 | 32 | 32 |
| | 119 | 117 | 2 | 7033 | 33 | 33 |
| 18 | 120 | 118 | 2 | 7034 | 34 | 34 |
| | 121 | 119 | 2 | 7035 | 35 | 35 |
| | 122 | 120 | 2 | 7036 | 36 | 36 |
| | 123 | 121 | 2 | 7037 | 37 | 37 |
| | 124 | 122 | 2 | 7038 | 38 | 38 |
| | 125 | 123 | 2 | 7039 | 39 | 39 |
| | 126 | 124 | 2 | 7040 | 40 | 40 |
| 19 | 127 | 125 | 2 | 7041 | 41 | 41 |
| | 128 | 126 | 2 | 7042 | 42 | 42 |
| | 129 | 127 | 2 | 7043 | 43 | 43 |
| | 130 | 128 | 2 | 7044 | 44 | 44 |
| | 131 | 129 | 2 | 7045 | 45 | 45 |
| | 132 | 130 | 2 | 7046 | 46 | 46 |
| | 133 | 131 | 2 | 7050 | 47 | 47 |
| 20 | 134 | 132 | 3 | 6001 | 1 | 1 |
| | 135 | 133 | 3 | 6002 | 2 | 2 |
| | 136 | 134 | 3 | 6003 | 3 | 3 |
| | 137 | 135 | 3 | 6004 | 4 | 4 |
| | 138 | 136 | 3 | 6005 | 5 | 5 |
| | 139 | 137 | 3 | 6006 | 6 | 6 |
| | 140 | 138 | 3 | 6007 | 7 | 7 |
| 21 | 141 | 139 | 3 | 6008 | 8 | 8 |
| | 142 | 140 | 3 | 6009 | 9 | 9 |
| | 143 | 141 | 3 | 6010 | 10 | 10 |
| | 144 | 142 | 3 | 6011 | 11 | 11 |
| | 145 | 143 | 3 | 6012 | 12 | 12 |
| | 146 | 144 | 3 | 6013 | 13 | 13 |
| | 147 | 145 | 3 | 6014 | 14 | 14 |
| 22 | 148 | 146 | 3 | 6015 | 15 | 15 |
| | 149 | 147 | 3 | 6016 | 16 | 16 |
| | 150 | 148 | 3 | 6017 | 17 | 17 |
| | 151 | 149 | 3 | 6018 | 18 | 18 |
| | 152 | 150 | 3 | 6019 | 19 | 19 |
| | 153 | 151 | 3 | 6020 | 20 | 20 |
| | 154 | 152 | 3 | 6021 | 21 | 21 |
| 23 | 155 | 153 | 3 | 6022 | 22 | 22 |
| | 156 | 154 | 3 | 6023 | 23 | 23 |
| | 157 | 155 | 3 | 6024 | 24 | 24 |
| | 158 | 156 | 3 | 6025 | 25 | 25 |
| | 159 | 157 | 3 | 6026 | 26 | 26 |
| | 160 | 158 | 3 | 6027 | 27 | 27 |
| | 161 | 159 | 3 | 6028 | 28 | 28 |
| 24 | 162 | 160 | 3 | 6029 | 29 | 29 |
| | 163 | 161 | 3 | 6030 | 30 | 30 |
| | 164 | 162 | 3 | 6031 | 31 | 31 |
| | 165 | 163 | 3 | 6032 | 32 | 32 |
| | 166 | 164 | 3 | 6033 | 33 | 33 |
| | 167 | 165 | 3 | 6034 | 34 | 34 |
| | 168 | 166 | 3 | 6035 | 35 | 35 |
| 25 | 169 | 167 | 3 | 6036 | 36 | 36 |
| | 170 | 168 | 3 | 6037 | 37 | 37 |
| | 171 | 169 | 3 | 6038 | 38 | 38 |
| | 172 | 170 | 3 | 6039 | 39 | 39 |
| | 173 | 171 | 3 | 6040 | 40 | 40 |
| | 174 | 172 | 3 | 6041 | 41 | 41 |

## TABLE M: Description of Product Two

PRODUCT 2: RESEARCH TAPES

Data sorted by ship track.
Each trace = 30 sec reduced, 100 sps = 12240 bytes/trace

Gathers 1- 86 = Line 1 (86 gathers)
Gathers 87-133 = Line 2 (47 gathers)
Gathers 134-174 = Line 3 (41 gathers)

| Ship track # | Ship track name | # of air-gun shots (traces) | gather size (mb) | # tapes | gaths tape 1 | gaths tape 2 | gaths tape 3 | gaths tape 4 |
|---|---|---|---|---|---|---|---|---|
| 1 | 01 | 653 | 5.4 | 1 | 1-174 | | | |
| 2 | 01R | 2310 | 19.0 | 3 | 1- 66 | 67-132 | 133-174 | |
| 3 | 01X | 848 | 7.0 | 1 | 1-174 | | | |
| 4 | 01Y | 968 | 8.0 | 2 | 1-159 | 160-174 | | |
| 5 | TR1 | 976 | 8.0 | 2 | 1-157 | 158-174 | | |
| 6 | 03 | 2446 | 20.2 | 3 | 1- 63 | 64-126 | 127-174 | |
| 7 | 03R | 2488 | 20.5 | 3 | 1- 62 | 63-124 | 125-174 | |
| 8 | TR2 | 394 | 3.2 | 1 | 1-174 | | | |
| 9 | 02 | 3117 | 25.7 | 4 | 1- 49 | 50- 98 | 99-147 | 148-174 |
| 10 | 02R | 722 | 5.9 | 1 | 1-174 | | | |
| 11 | 02X | 1296 | 10.7 | 2 | 1-119 | 120-174 | | |
| 12 | 02Y | 1519 | 12.5 | 2 | 1-101 | 102-174 | | |
| 13 | 02Z | 783 | 6.5 | 1 | 1-174 | | | |
| 14 | TR3 | 1074 | 8.8 | 2 | 1-143 | 144-174 | | |
| 15 | 01A | 1227 | 10.1 | 2 | 1-125 | 126-174 | | |
| 16 | 01B | 1307 | 10.8 | 2 | 1-118 | 119-174 | | |
| Total | | 22,128 | 270.85 | 32 | | | | |

## TABLE N: SEG-Y Trace Header Table

**Bold descriptions are specific to LARSE**

| Size | Bytes | Original SEG-Y | LARSE SEG-Y |
|---|---|---|---|
| long | 1- 4 | Sequence number within line | Sequence number within line |
| long | 5- 8 | Sequence number within reel | Sequence number within reel |
| long | 9- 12 | Original field record number | **Common Receiver Gather index# [1-174]** |
| long | 13- 16 | Original trace record number | **Common Receiver Trace index# [1-22,138]** |
| long | 17- 20 | Energy source point number | **SP# for this line [101-N_EOL]** |
| long | 21- 24 | CDP ensemble number | CDP number [empty] |
| long | 25- 28 | Trace number in CDP ensemble | CDP trace number [empty] |
| short | 29- 30 | Trace identification code: | SEG-Y Trace identification code **=1** |
| short | 31- 32 | No. vertically summed traces | No. vertically summed traces |
| short | 33- 34 | No. horizontally summed traces | No. horizontally summed traces |
| short | 35- 36 | flag: 1 = production, 2 = test" | flag: 1 = production, 2 = test **[set to 1]** |
| long | 37- 40 | Source to receiver distance | **Source-receiver offset** |
| long | 41- 44 | Receiver group elevation | Receiver group elevation [from geometry] |
| long | 45- 48 | Source surface elevation | Source surface elevation **[0 for sea level]** |
| long | 49- 52 | Source depth | Source depth **(air-gun depths)** |
| long | 53- 56 | Datum elevation at receiver | Elevation at receiver wrt WGS-84 spheroid |
| long | 57- 60 | Datum elevation at source | Elevation at source wrt WGS-84 spheroid |
| long | 61- 64 | Water depth at source | Water depth at source [depth of air-gun s] |
| long | 65- 68 | Water depth at receiver group | Water depth at receiver |
| short | 69- 70 | Elevation value scaler | Elevation value scaler **[set to 1]** |
| short | 71- 72 | Coordinate value scaler | Coordinate value scaler **[set to -10]** |
| long | 73- 76 | Source X-coordinate | **Source long deci-sec of arc** (/36000.) |
| long | 77- 80 | Source Y-coordinate | **Source lat deci-sec of arc** (/36000.) |
| long | 81- 84 | Receiver X-coordinate | **Receiver long deci-sec of arc** (/36000.) |
| long | 85- 88 | Receiver Y-coordinate | **Receiver lat deci-sec of arc** (/36000.) |
| short | 89- 90 | Coordinate units (1-m/ft 2-sec-arc) | Coordinate units [constant at **2=deg**] |
| short | 91- 92 | Weathering vel at CDP (unit/sec) | Weathering velocity [empty] |
| short | 93- 94 | Sub-weathering vel. | **LMO reducing velocity (m/s) [6000]** |
| short | 95- 96 | Uphole time at source in microsec | Uphole time at source in microsec |
| short | 97- 98 | Uphole time at rec. in microsec | Uphole time at rec. in microsec |
| short | 99-100 | Shotpoint static in msec | Source static (msec) |
| short | 101-102 | Receiver static at CDP in msec | Receiver static (msec) |
| short | 103-104 | "Total static applied *10,000" | **Total static applied *10,000** |
| short | 105-106 | Lag time A (msec) | Lag time A (msec) |
| short | 107-108 | Lag time B | Lag time B |
| short | 109-110 | Delay recording time | **Relative time of first sample (msec) [-5000]** |
| short | 111-112 | Front mute time in sec | **Polarity [set = 1] (see below)** |
| short | 113-114 | Tail mute in sec | **Orientation (see below)** |
| short | 115-116 | Number of samples in this trace | **#Samples if <2^15; else=32767 (see 229-232)** |
| short | 117-118 | Sampling interval in microsec | **Sampling interval in microsec** |
| short | 119-120 | Gain type: 1=fixed 2=binary... | **PASSCAL:Gain type** |
| short | 121-122 | Instrument gain constant | **PASSCAL:instrument gain constant** |
| short | 123-124 | Instrument inital gain in dB | **instrument inital gain in dB** |
| short | 125-126 | Correlated trace? 1=no 2=yes | **\ UTM source X** |
| short | 127-128 | Sweep start frequency | **/ "** |

| | | | |
|---|---|---|---|
| short | 129-130 | Sweep end frequency | **\ UTM source Y** |
| short | 131-132 | Sweep length in milliseconds | **/ "** |
| short | 133-134 | "Sweep type 1=lin, 2=parab.. | **\ UTM receiver X** |
| short | 135-136 | Sweep taper at start of trace | **/ "** |
| short | 137-138 | Sweep taper at end of trace | **\ UTM receiver Y** |
| short | 139-140 | Taper type | **/ "** |
| short | 141-142 | Alias filter frequency | **Colocation station (0=NO, 1=YES)** |
| short | 143-144 | Alias filter slope | alias filter slope |
| short | 145-146 | Notch filter frequency | notch filter frequency |
| short | 147-148 | Notch filter slope | notch filter slope |
| short | 149-150 | Low-cutoff frequency | low-cutoff frequency |
| short | 151-152 | Hi-cutoff frequency | **Deployment # (1, 2, or 3) not used** |
| short | 153-154 | Low-cutoff slope | **Ship track # [1-16]** |
| short | 155-156 | Hi-cutoff slope | **Ship track trace # [1-EOL]** |
| short | 157-158 | Year data was recorded | **Year of trace first sample** |
| short | 159-160 | Day of year | **Day of trace first sample** |
| short | 161-162 | Hour of day (24 hour clock) | **Hour of trace first sample** |
| short | 163-164 | Minute of hour | **Minute of trace first sample** |
| short | 165-166 | Second of minute | **Second of trace first samle** |
| short | 167-168 | Time code: 1=local 2=GMT... | **Time code [GMT=2]** |
| short | 169-170 | Trace weighting factor | **Common station gather # [1-172]** |
| short | 171-172 | Geophone group # roll switch | **Line # [1,2,3]** |
| short | 173-174 | Group # of 1st trace in field data | **PASSCAL: Field stake #** |
| short | 175-176 | Group # of last trace in field | **C.S.G. this line [1-84,47, or 41]** |
| short | 177-178 | Gap size | **C.R.G. this line [1-86,47, or 41]** |
| short | 179-180 | Over travel of line taper | **Component (Z=1, N-S=2, E-W=3)** |
| short | 181-182 | | **\ Microsec of trace first sample** |
| short | 183-184 | | **/ "** |
| short | 185-186 | | **Charge size (kg); airgun size (cu in)** |
| short | 187-188 | | **Shot/trigger time - year** |
| short | 189-190 | | **Shot/trigger time- Julian day** |
| short | 191-192 | | **Shot/trigger time - hour** |
| short | 193-194 | | **Shot/trigger time - minute** |
| short | 195-196 | | **Shot/trigger time - second** |
| short | 197-198 | | **\ Shot/trigger time - microsec** |
| short | 199-200 | | **/ "** |
| long | 201-204 | | Override for sample interval (IASPEI) |
| short | 205-206 | | **Azimuth of sensor orient axis** |
| short | 207-208 | | **Geophone inclination** |
| short | 209-210 | | **\ LMO static (x/v) (ms)** |
| short | 211-212 | | **/ "** |
| short | 213-214 | | **LMO has been used (0=Y, 1=N)** |
| short | 215-216 | | **Recording instrument type (coded)** |
| short | 217-218 | | **correction to be applied: (SET=0)** |
| short | 219-220 | | **Azimuth of source-receiver (min of arc)** |
| short | 221-222 | | **Geophone type (coded)** |
| short | 223-224 | | **Geophone number** |
| short | 225-226 | | **DAS #** |
| short | 227-228 | | not to be used |
| long | 229-232 | | **Number of samples (see 115-116)** |
| short | 233-234 | | **\ Reftek amplitude bias removed** |
| short | 235-236 | | **/ "** |
| short | 237-238 | | **Timing correction from clockcorr** |
| short | 239-240 | | blank |

## Table N (Continued)
## Values of LARSE-Specific header values

| Size | Bytes | LARSE SEG-Y |
|---|---|---|
| long | 9- 12 | **Common Receiver Gather index#. [1-174]** (***CRG#*** below) |
| short | 171-172 | **Line # [1,2,3]** (***Line#*** below) |
| short | 177-178 | **C.R.G. this line [1-86,47, or 41]** (1-***n_CRG*** below) |

| | ***CRG#*** | ***Line#*** | ***n_CRG*** |
|---|---|---|---|
| Gathers | 1- 86 = | 1 | (86 gathers) |
| Gathers | 87-133 = | 2 | (47 gathers) |
| Gathers | 134-174 = | 3 | (41 gathers) |

| Size | Bytes | LARSE SEG-Y |
|---|---|---|
| long | 13- 16 | **Common Receiver Trace index#. [1-22,138]** (***CRT#*** below) |
| long | 17- 20 | **R/V Ewing Shot Point# for this line. [101- SP end]** (***SP#*** below) |
| short | 153-154 | **Ship track # [1-16]** (***Track #*** below) |
| short | 155-156 | **Ship track trace # [1-# Traces]** (1-***#TRCS*** below) |

| | ***Track#*** | ***CRT#*** | ***#TRCS*** | ***SP#*** | |
|---|---|---|---|---|---|
| Line Name | Internal Ship Track# | Cum Air-gun Sources | # Traces (# of shots) | Shot Point: start | end |
| 01 | 1 | 1- 653 | 653 | 101 | 753 |
| 01R | 2 | 654- 2963 | 2310 | 105 | 2414 |
| 01X | 3 | 2964- 3811 | 848 | 101 | 935 |
| 01Y | 4 | 3812- 4779 | 968 | 101 | 1068 |
| TR1 | 5 | 4780- 5755 | 976 | 101 | 783 |
| 03 | 6 | 5756- 8201 | 2446 | 101 | 2546 |
| 03R | 7 | 8202-10689 | 2488 | 101 | 2587 |
| TR2 | 8 | 10690-11083 | 394 | 101 | 494 |
| 02 | 9 | 11084-14200 | 3117 | 101 | 3215 |
| 02R | 10 | 14201-14922 | 722 | 101 | 822 |
| 02X | 11 | 14923-16218 | 1296 | 101 | 1369 |
| 02Y | 12 | 16219-17737 | 1519 | 101 | 1619 |
| 02Z | 13 | 17738-18520 | 783 | 101 | 883 |
| TR3 | 14 | 18521-19594 | 1074 | 101 | 1174 |
| 01A | 15 | 19595-20821 | 1227 | 101 | 1327 |
| 01B | 16 | 20822-22128 | 1307 | 101 | 1407 |

| Size | Bytes | LARSE SEG-Y |
|---|---|---|
| short | 111-112 | **Polarity (set = 1)**<br>The convention used is<br>POSITIVE DEFLECTION = GROUND UP, NORTH, OR EAST |
| short | 113-114 | **Orientation (set = 1)** [only vertical component recorded for this data].<br>For channel 1 (vertical component): SET = 0.<br>For channels 2 and 3 (horizontal components):<br>0--North arrow on geophone points North<br>1--North arrow on geophone points West<br>2--North arrow on geophone points East |

| Size | Bytes | LARSE SEG-Y |
|---|---|---|
| short | 141-142 | **Colocation station (0=NO, 1=YES)** (see Table J). |
| short | 173-174 | **PASSCAL: Field stake #** see Tables D, E, F, or J |
| short | 215-216 | **Recording instrument type [Set= 13]** Modified IASPEI:<br>1=PRS1 3=GEOS 7=SGR<br>9=PRS4 13=REFTEK (all types) |
| short | 221-222 | **Geophone type (coded)** Modifield IASPEI:<br>1=L28 (4.5 Hz; PASSCAL) 2=L22 (2 Hz)<br>3=L10B (8 Hz) 4=*L4* (1 Hz)<br>5=*L4* (2 Hz) 6=FBA<br>7=L28 (4.5 Hz; UTEP) |
| short | 225-226 | **DAS #** (see Table J). |

| Size | Bytes | LARSE SEG-Y | |
|---|---|---|---|
| long | 73- 76 | **Source long deci-sec of arc** (/36000.) | } [divide by 36000 to get |
| long | 77- 80 | **Source lat deci-sec of arc** (/36000.) | } in decimal degrees] |
| long | 81- 84 | **Receiver long deci-sec of arc** (/36000.) | } " " |
| long | 85- 88 | **Receiver lat deci-sec of arc** (/36000.) | } " " |
| short | 125-126 | **\ UTM source X** | } |
| short | 127-128 | / " | } |
| short | 129-130 | **\ UTM source Y** | } see Tables D, E, F |
| short | 131-132 | / " | } |
| short | 133-134 | **\ UTM receiver X** | } |
| short | 135-136 | / " | } |
| short | 137-138 | **\ UTM receiver Y** | } |
| short | 139-140 | / " | } |

| Size | Bytes | LARSE SEG-Y | |
|---|---|---|---|
| short | 157-158 | **Year of trace first sample** | } |
| short | 159-160 | **Day of trace first sample** | } see Tables B,C |
| short | 161-162 | **Hour of trace first sample** | } ( add -5000 msec to |
| short | 163-164 | **Minute of trace first sample** | } shot time) |
| short | 165-166 | **Second of trace first sample** | } |
| short | 187-188 | **Shot/trigger time - year** | } |
| short | 189-190 | **Shot/trigger time- Julian day** | } |
| short | 191-192 | **Shot/trigger time - hour** | } see Tables B,C |
| short | 193-194 | **Shot/trigger time - minute** | } |
| short | 195-196 | **Shot/trigger time - second** | } |
| short | 197-198 | **\ Shot/trigger time - microsec** | } |
| short | 199-200 | / " | } |

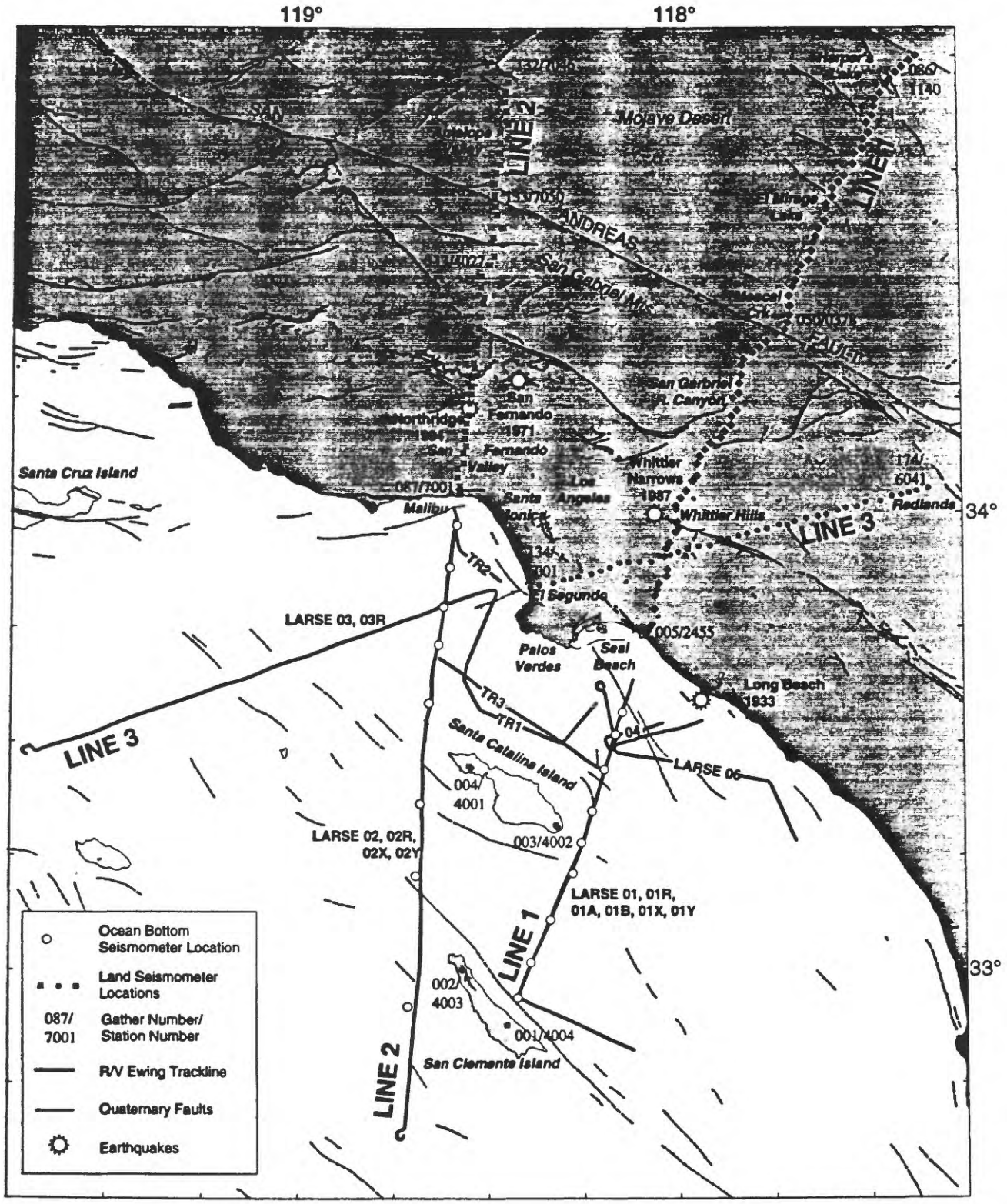


Fig. 1a. Map presenting an overview of offshore-onshore part of the LARSE experiment, showing locations of LARSE lines 1 to 6, and transit lines TR1 to TR3. Ocean Bottom Seismometer locations along lines 1 and 2 are shown as unfilled circles. Locations of stations along the three land arrays are also shown.

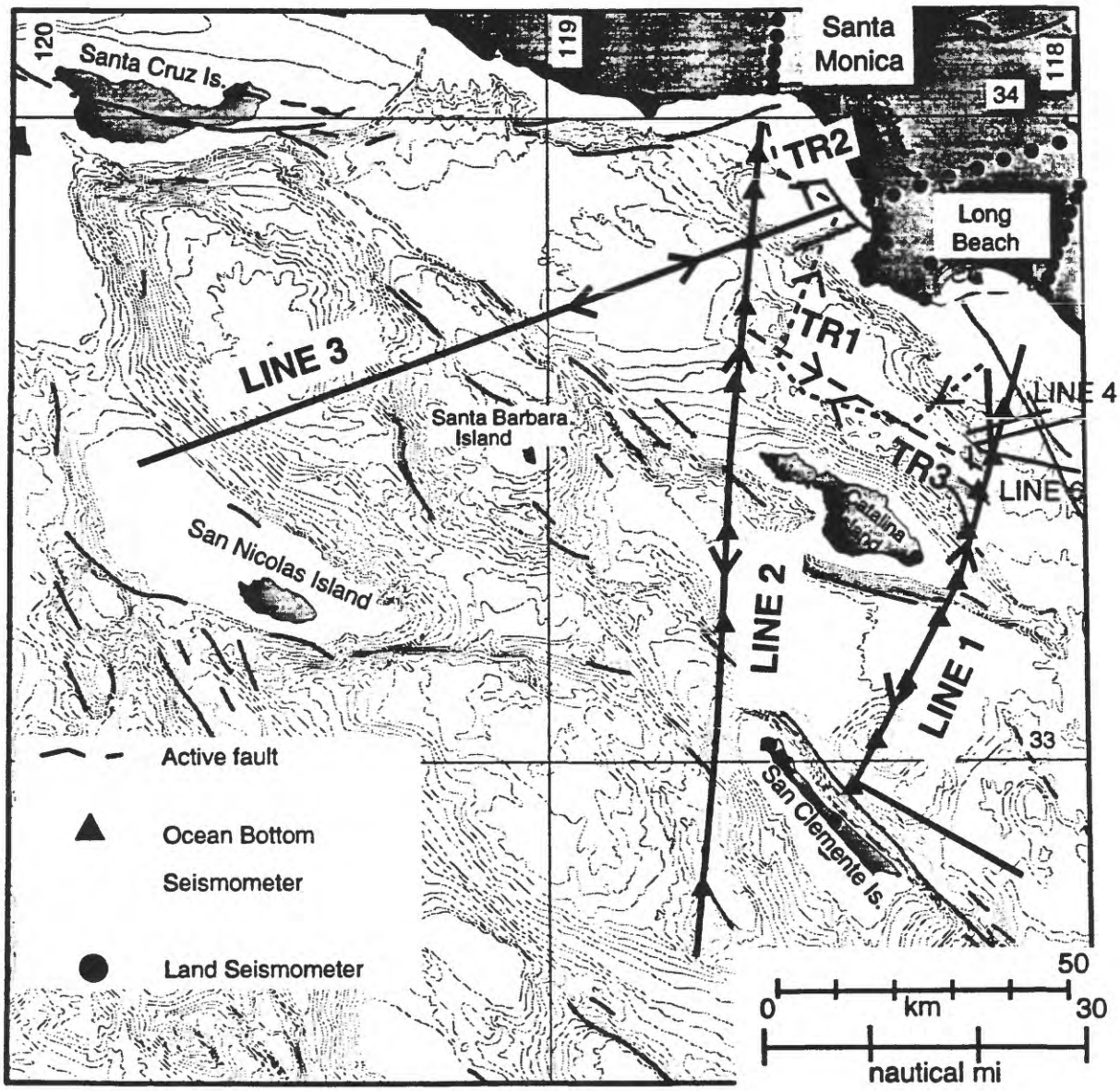


Fig. 1b. Detail map showing Ewing LARSE MCS reflection lines in Inner California Borderland. Unlabeled bathymetric contours provide indication of seafloor topography. Arrows along lines indicate direction ship traveled

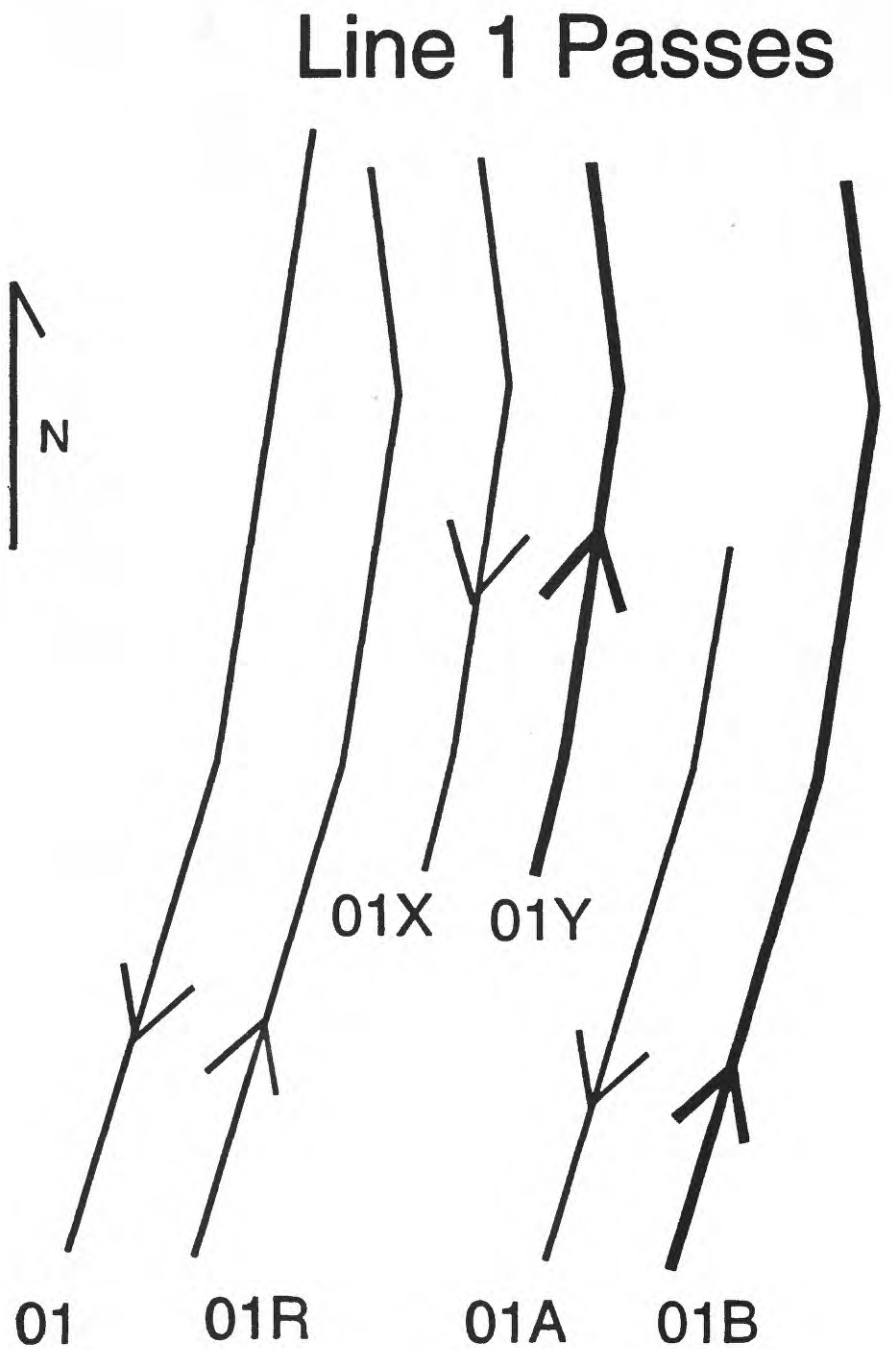


Fig. 2a. Schematic trackline plot for LARSE Line 1, showing the individual passes made over the line. Note that passes have been offset from each other for clarity. Arrow shows direction of **Ewing** track. Except for the first pass, LA01, the northern ends of all of the passes were kinked to the northwest to avoid the coastal shipping lanes. Heavy lines indicate ship tracks acquired during late night hours (2200 to 0600 L).

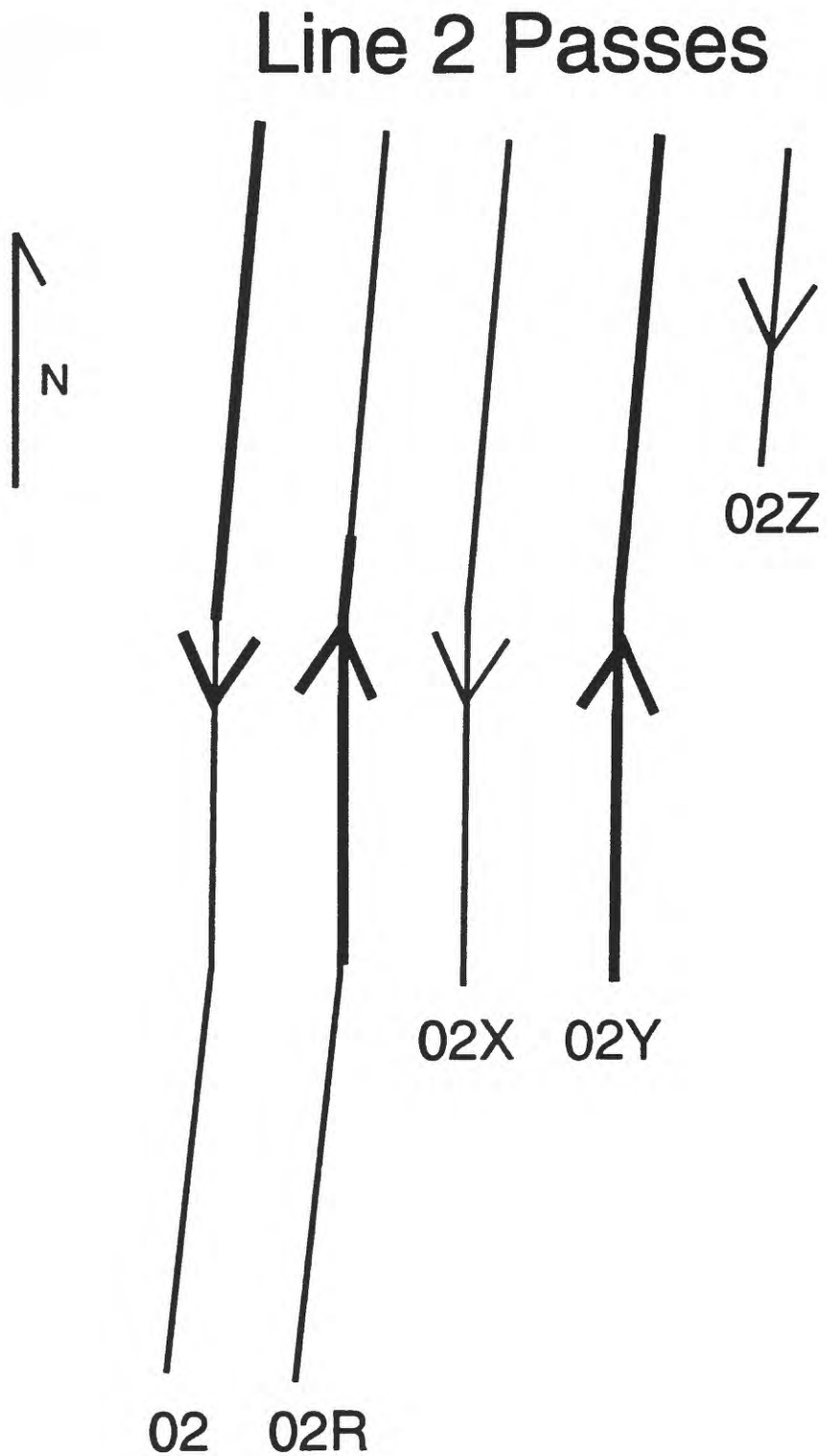


Fig. 2b. Schematic trackline plot for LARSE Line 2, showing the individual passes made over the line. Note that passes have been offset from each other for clarity. Arrows indicate direction of Ewing track. Heavy lines indicate tracklines acquired at late night hours (2200 to 0600 L).

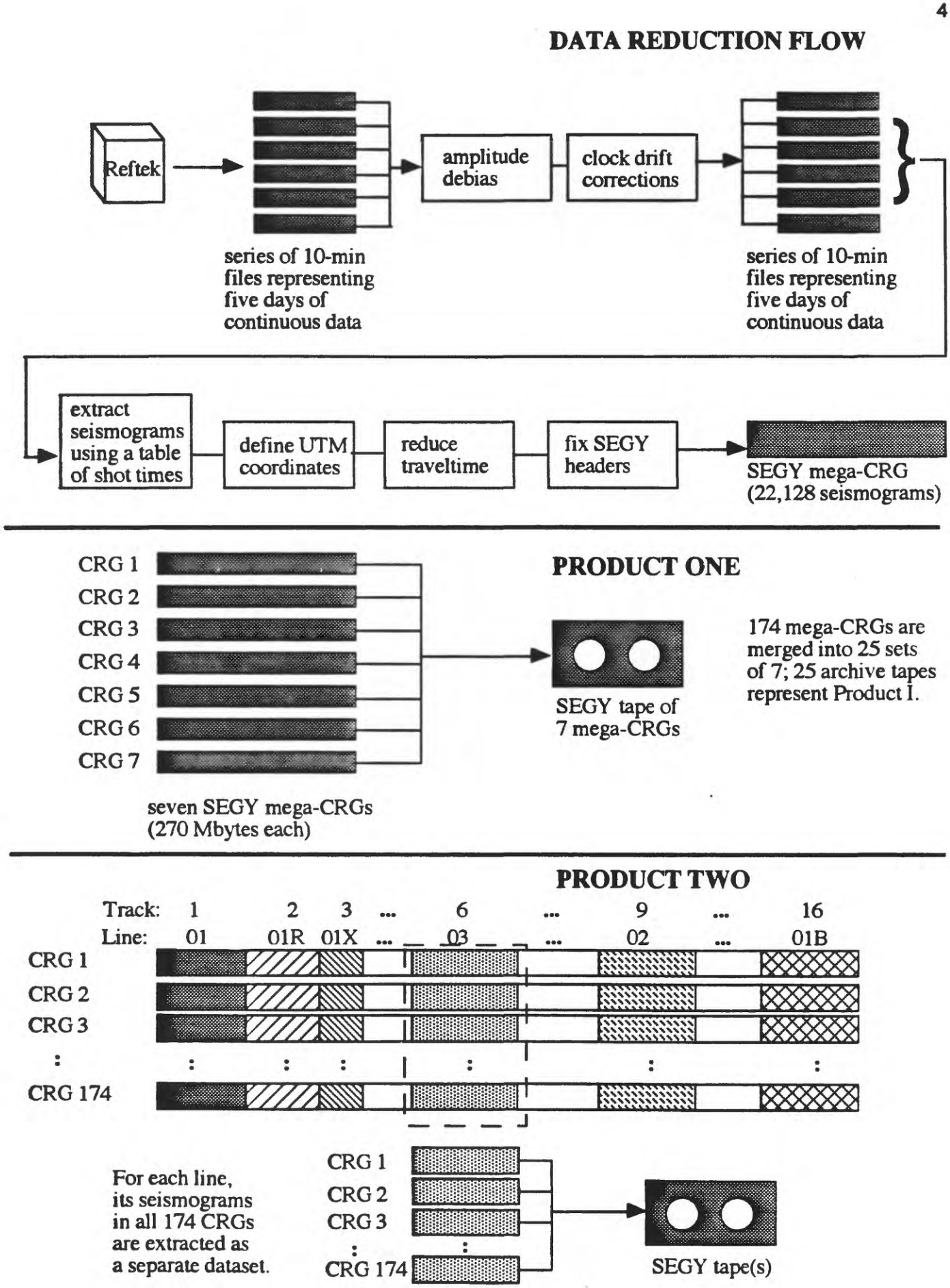


Fig. 3. Schematic of data reduction flow illustrating Product 1 and Product 2.

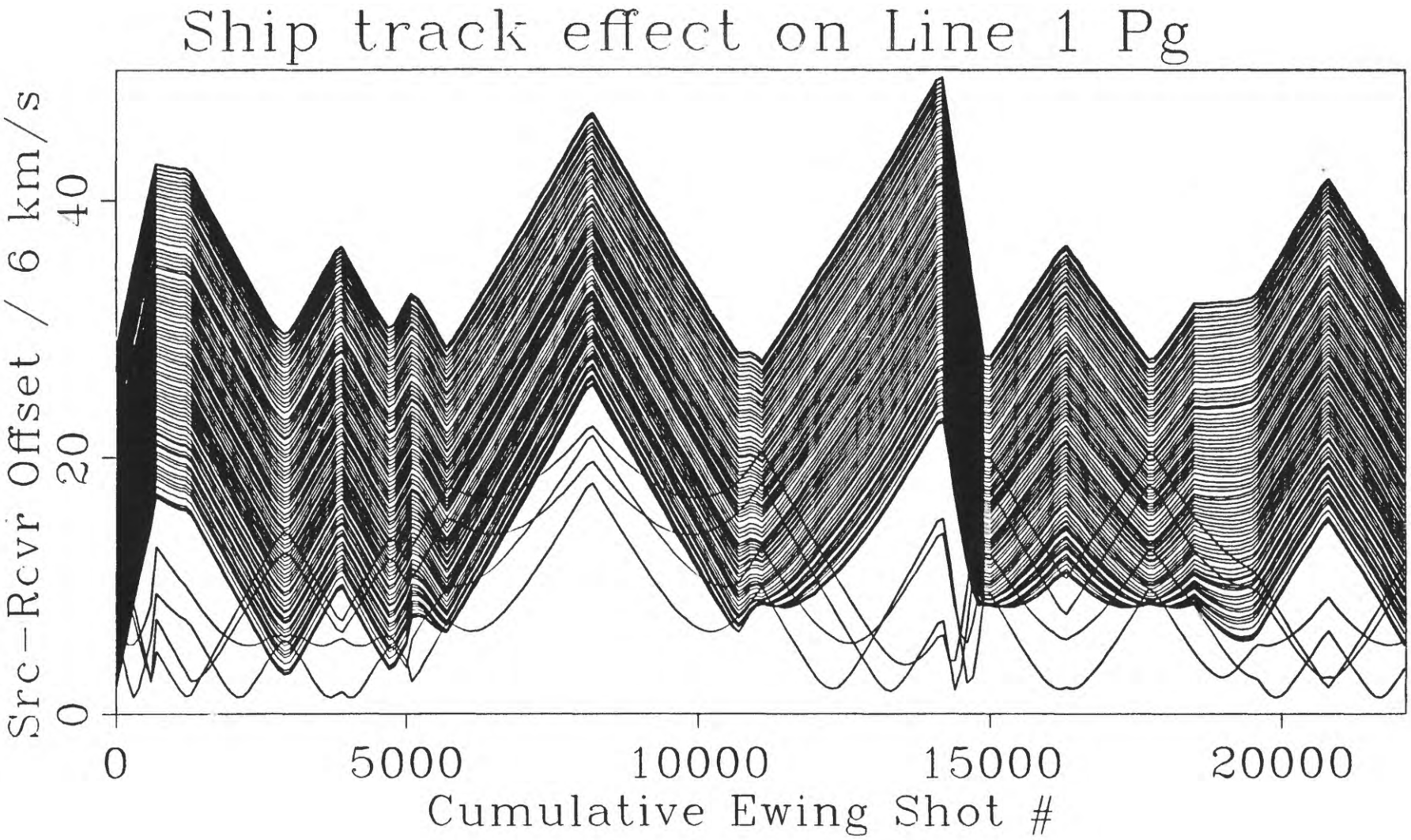


Fig. 4a. Source-receiver offset distance is displayed represented as travel time (t=offset/6.0). Cumulative *Ewing* shot number ranges between 1 to 22,128 (see Table A). Separate ship tracks are in general represented by line segments of the same slope or moveout. Steep moveout indicates the *Ewing* track was oblique to be accurately aligned to the station.

The slopes for Lines 01 and 01R are different due to the different shot spacing for the two lines (90 sec vs 20 sec at ~4.5 knots). The same is true for Lines 02 and 02R.

Line 1. Lowermost four curves represent the San Clemente and Santa Catalina gathers. Remaining curves represent gathers 5 through 86 of the onland Seal Beach stations (curve with maximum offset/travel time is gather 86 at a station in central Mojave).

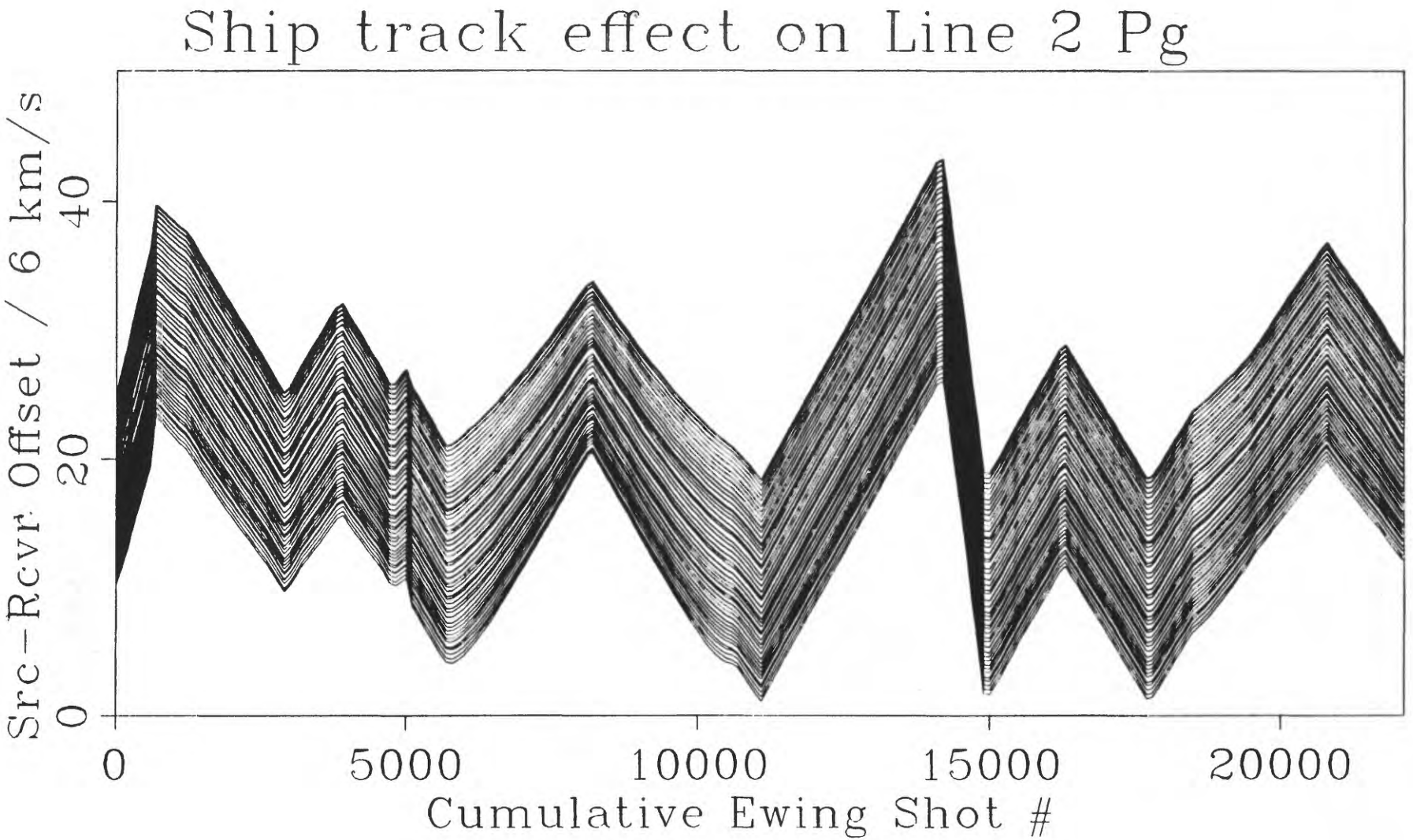


Fig. 4b. Line 2. Earliest curve (gather 1) is at station 7001 at Malibu; latest curve (gather 47) is at station 7050 in the west Mojave.

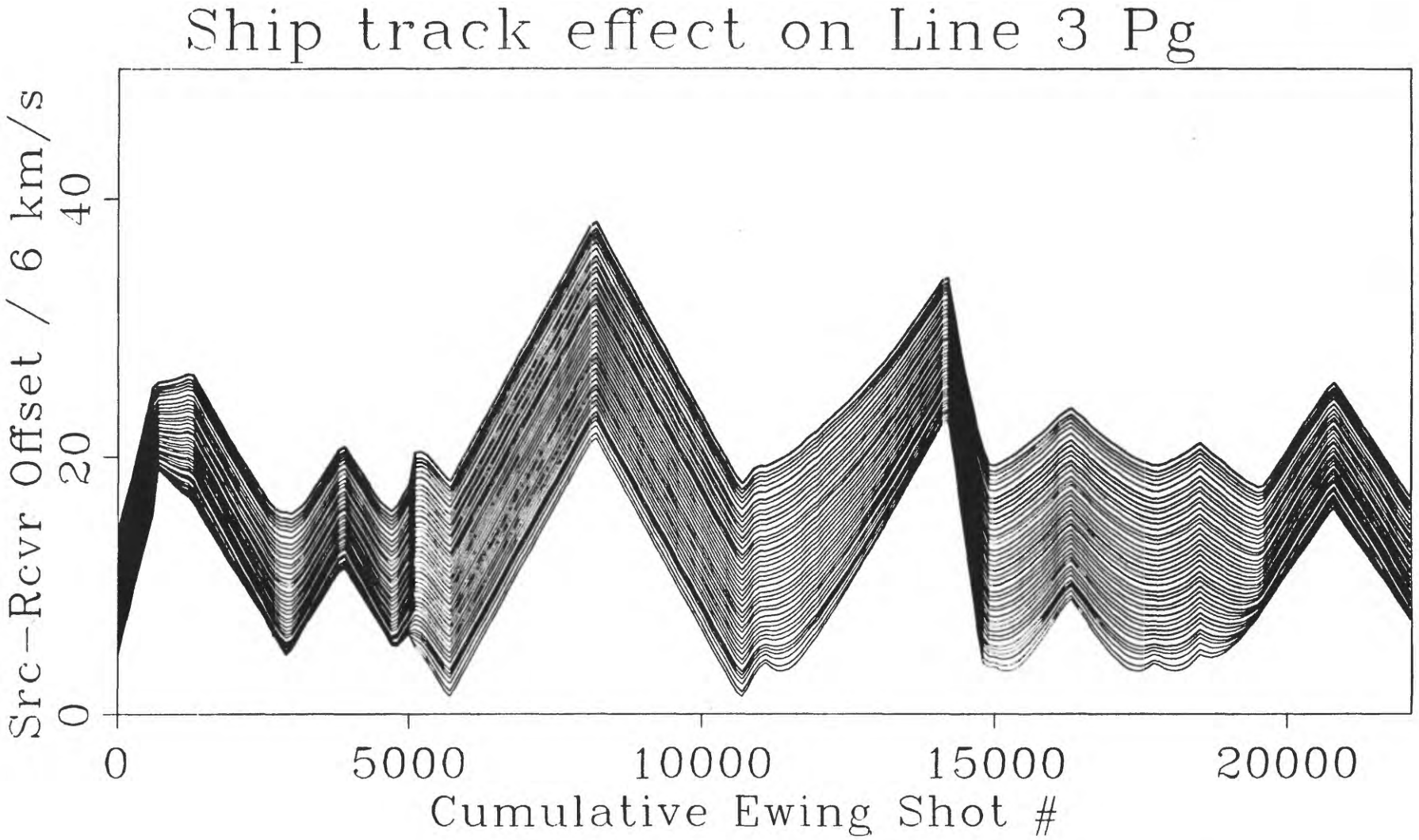


Fig. 4c. Line 3. Earliest curve (gather 1) is at station 6001 at El Segundo; latest curve (gather 41) is at station 6041 in the west Mojave.

## APPENDIX CAPTION

Inline Portion of Each of 174 Common Receiver Gathers.

Figures A-001 to A-031: Seal Beach Array - Line 1Y (ship track 04): gathers 001 to 031 representing stations 4004 to 2000.

Figures A-032 to A-086: Seal Beach Array - Line 1B (ship track 16): gathers 032 to 086 representing stations 0020 to 1140.

Figures A-087 to A-133: Northridge Array - Line 02 (ship track 09): gathers 087 to 133 representing stations 7001 to 7050 .

Figures A-134 to A-174: Los Angeles Basin Array - Line 03 (ship track 06): gathers 134 to 174 representing stations 6001 to 6041.

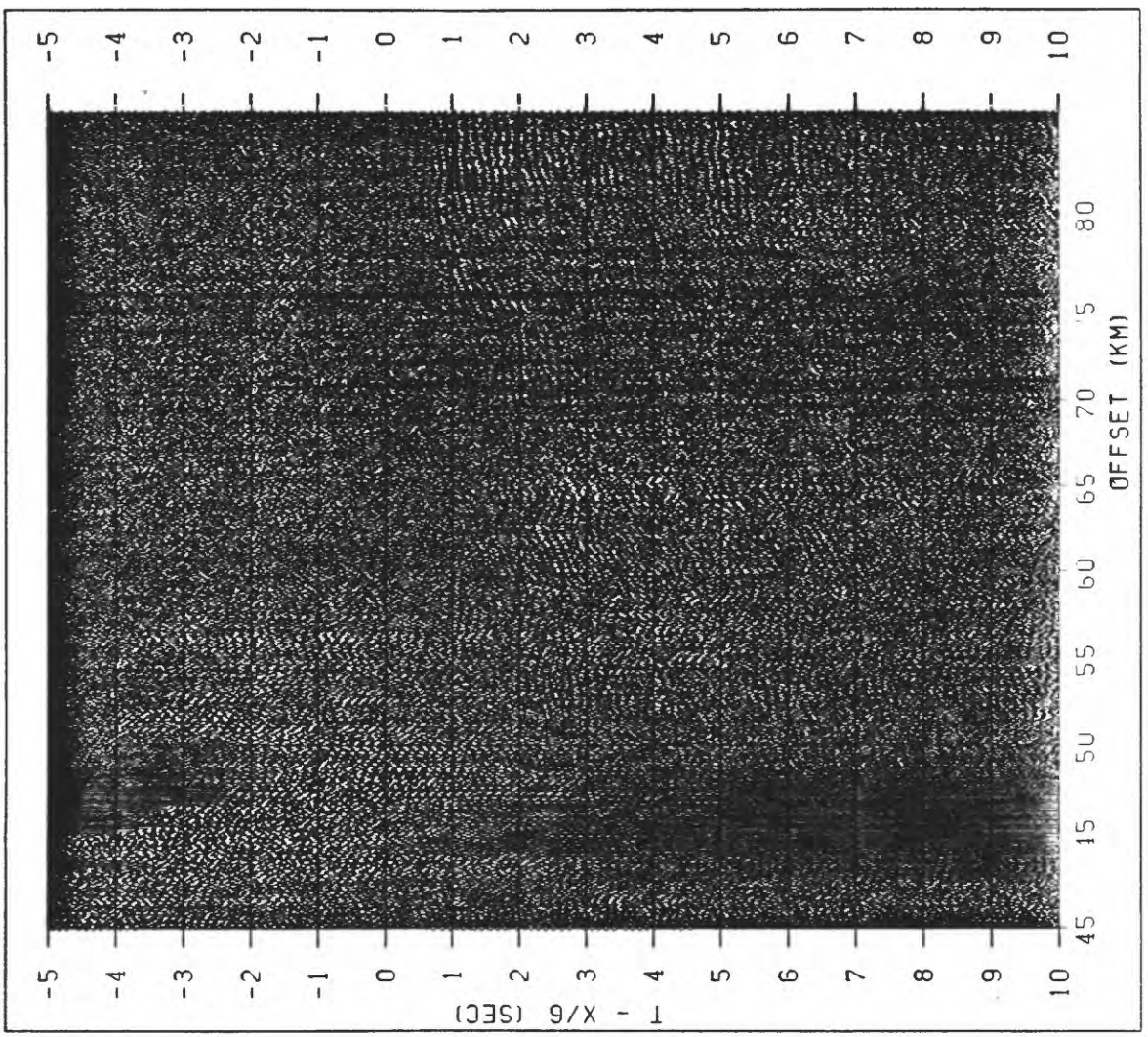


FIG. A-001. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 001
LINE 01Y - GATHER 01 / STATION 4001

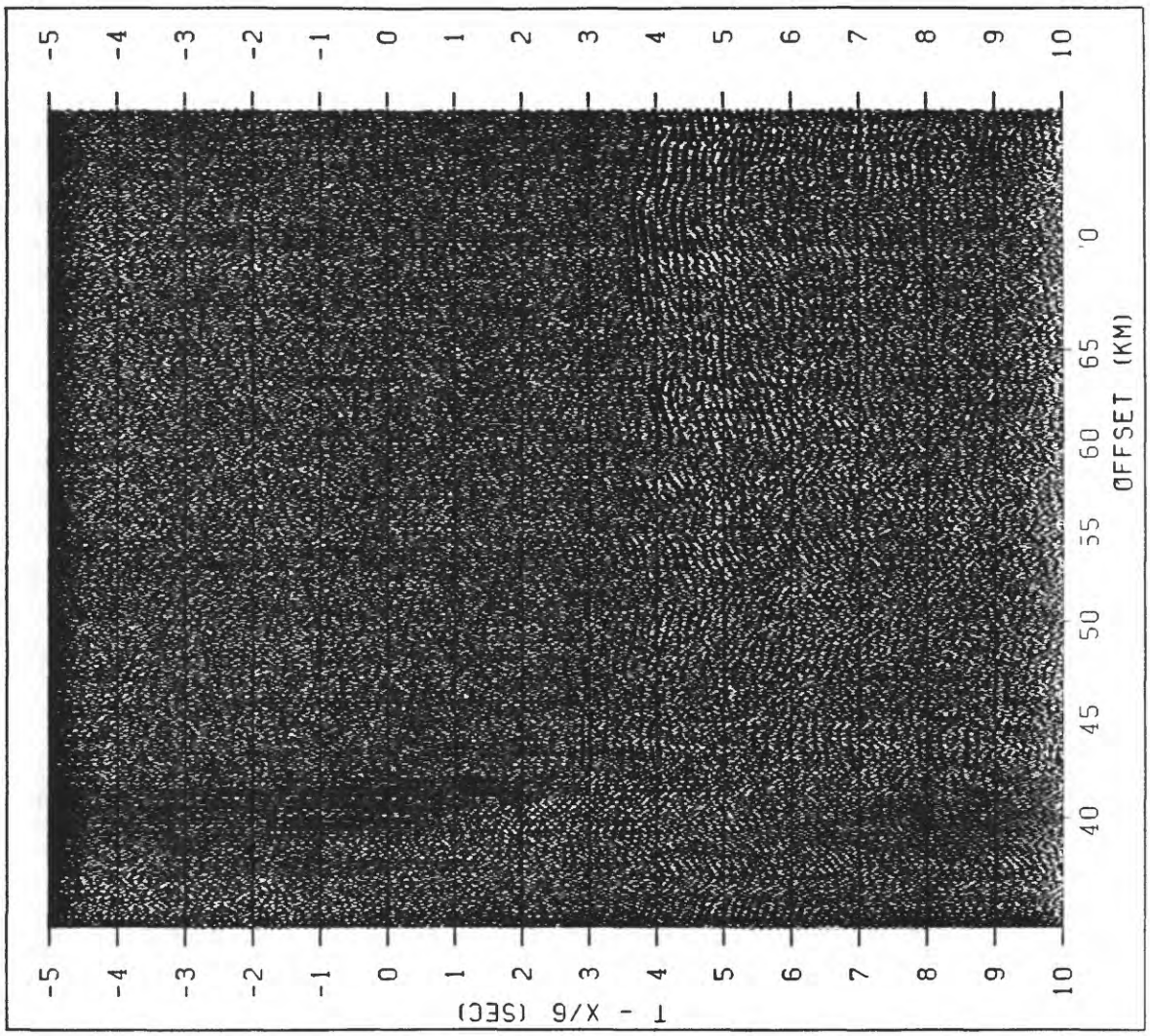


FIG. A-002. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 002
LINE 01Y - GATHER 02 / STATION 4002

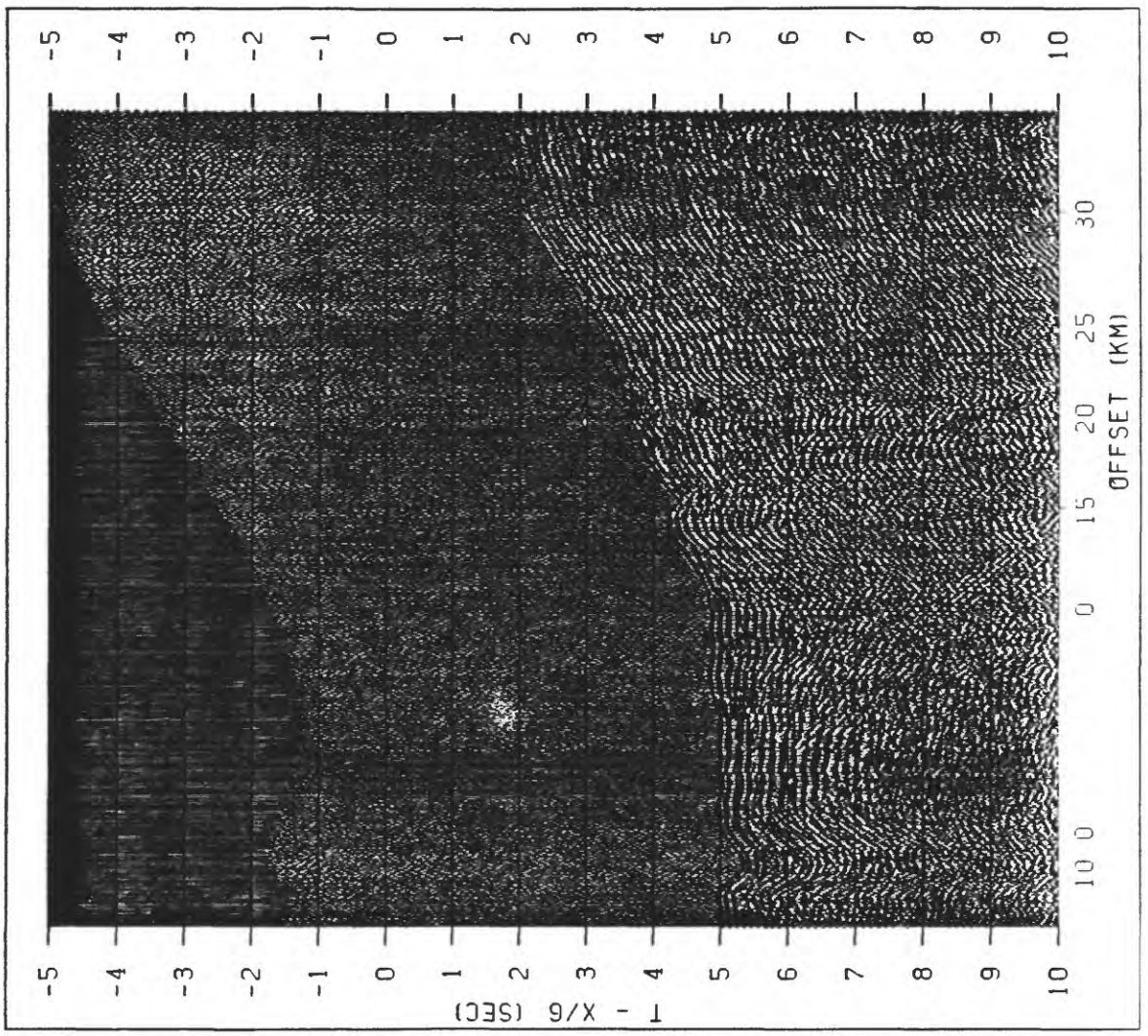


FIG. A-003. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 003
LINE 01Y - GATHER 03 / STATION 4003

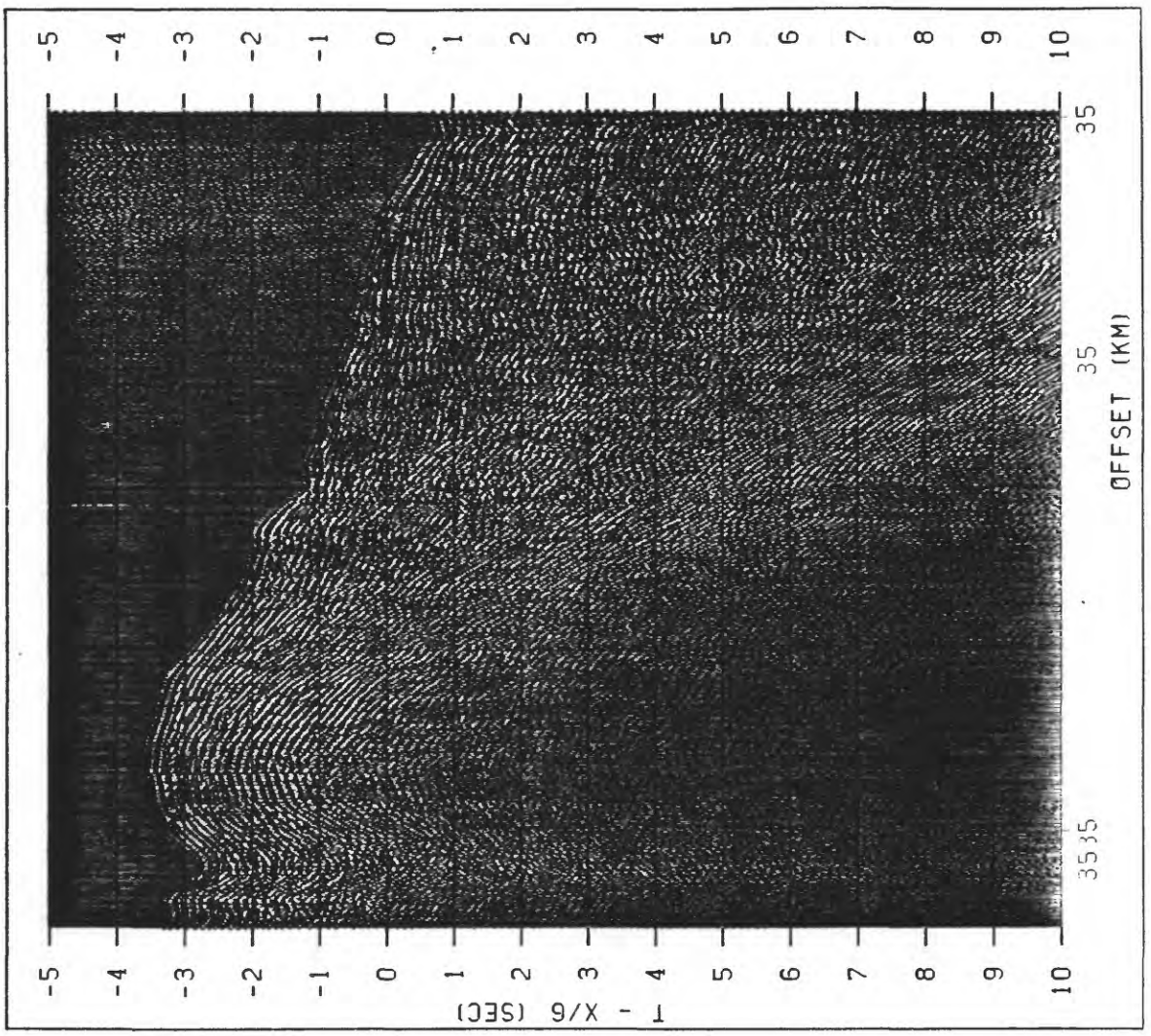


FIG. A-004. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 004
LINE 01Y - GATHER 04 / STATION 4004

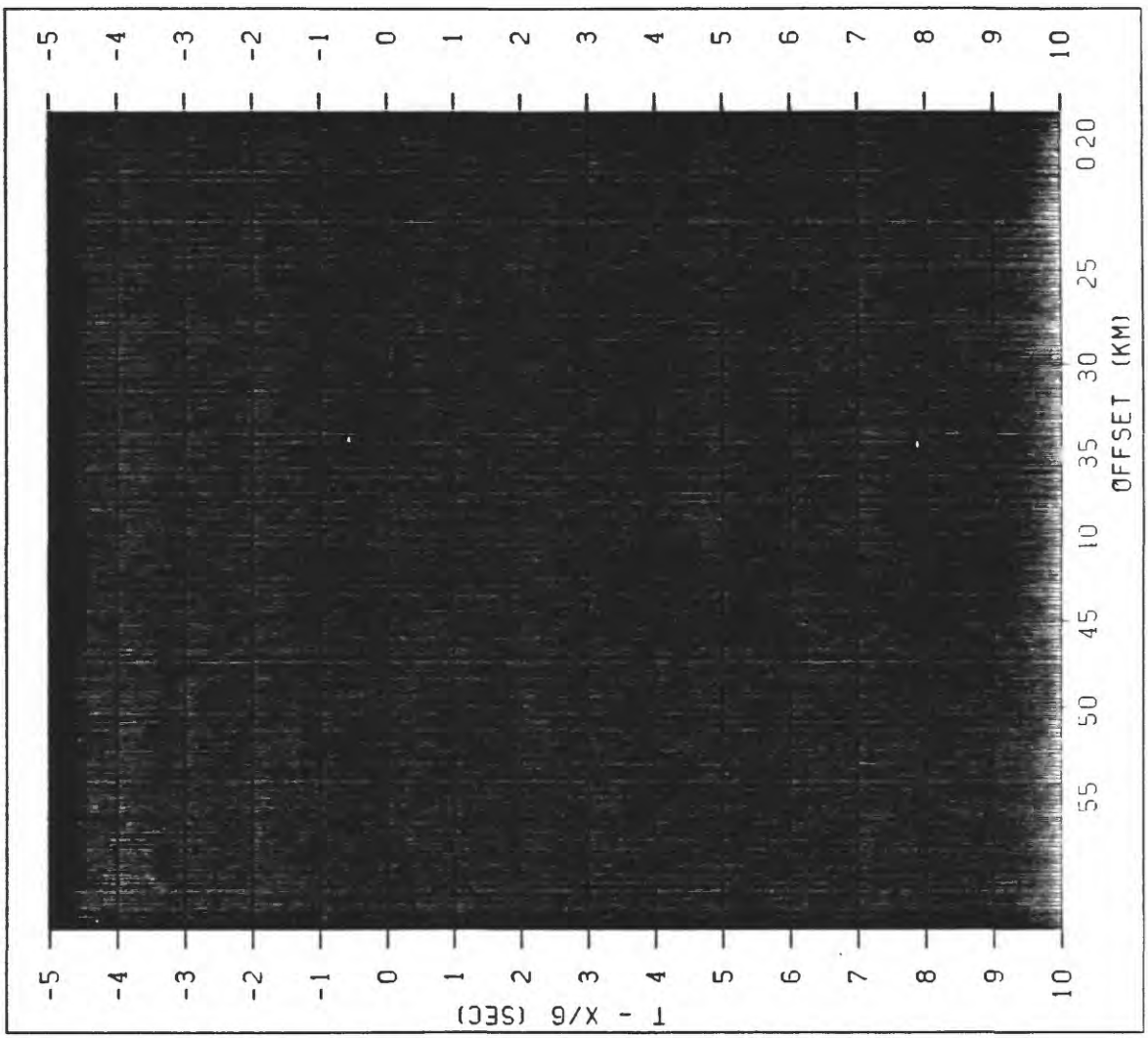


FIG. A-005. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 005
LINE 01Y - GATHER 05 / STATION 2455

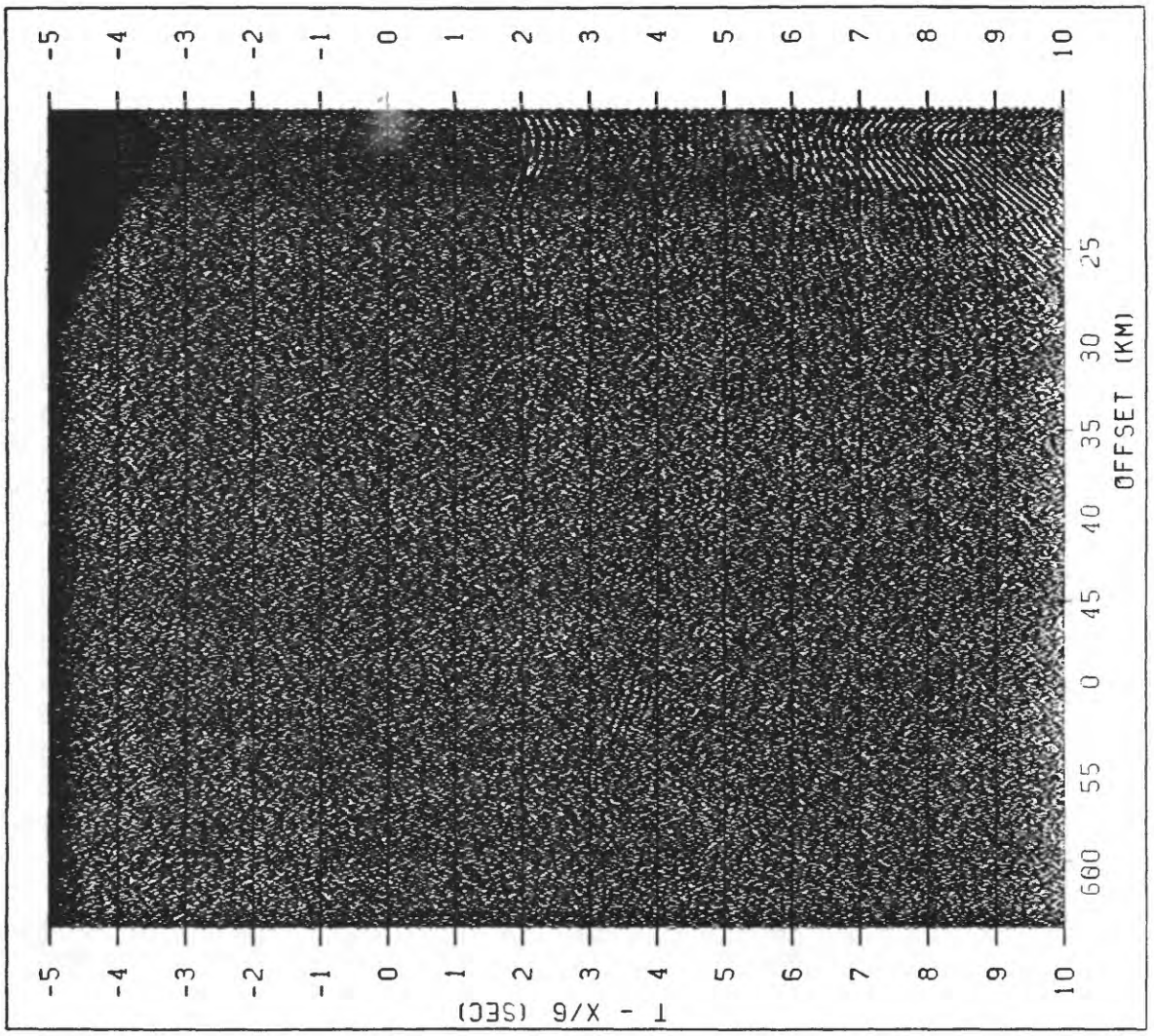


FIG. A-006. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 006
LINE 01Y - GATHER 06 / STATION 2445

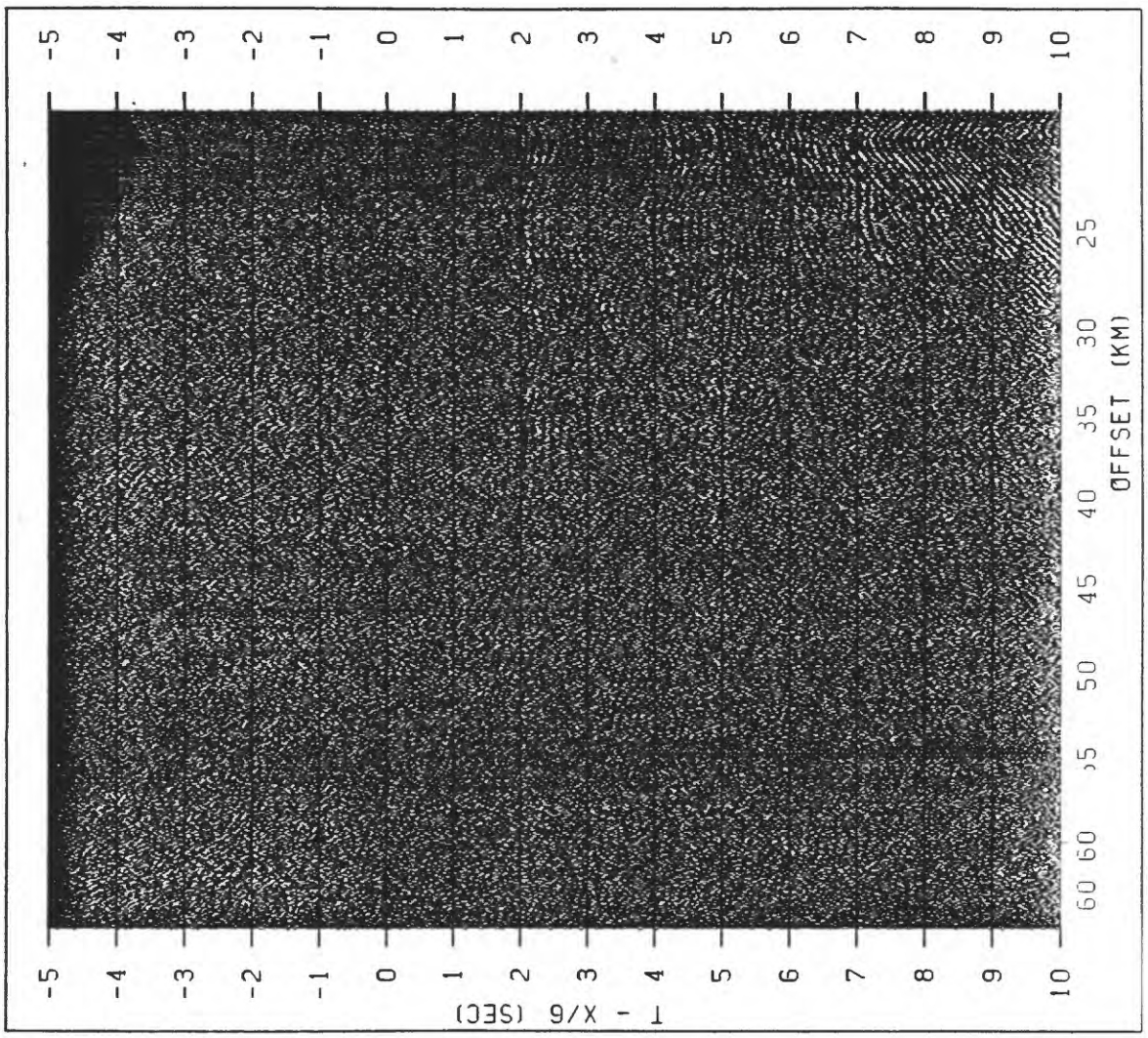


FIG. A-007. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 007
LINE 01Y - GATHER 07 / STATION 435

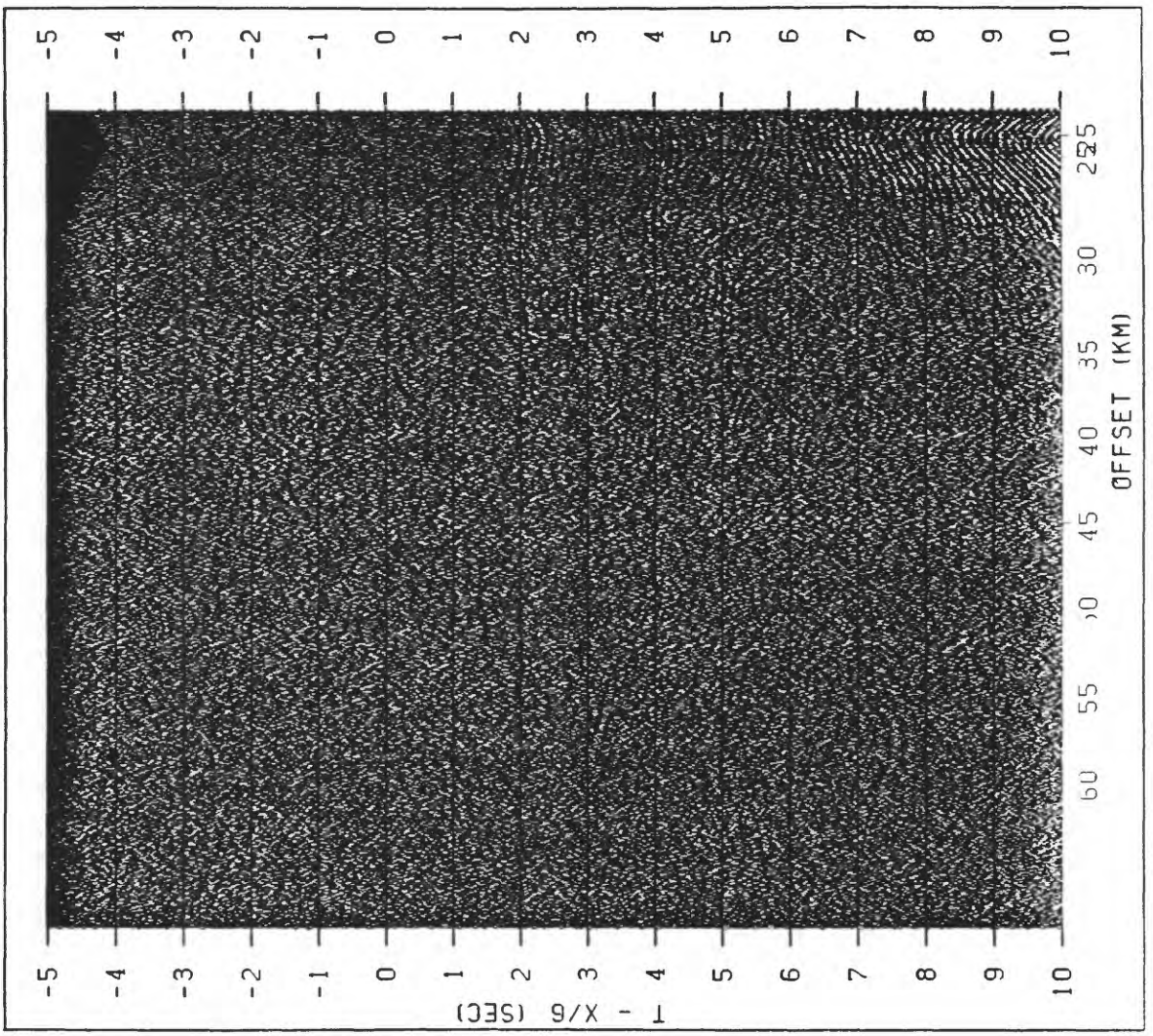


FIG. A-008. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 008
LINE 01Y - GATHER 08 / STATION 2400

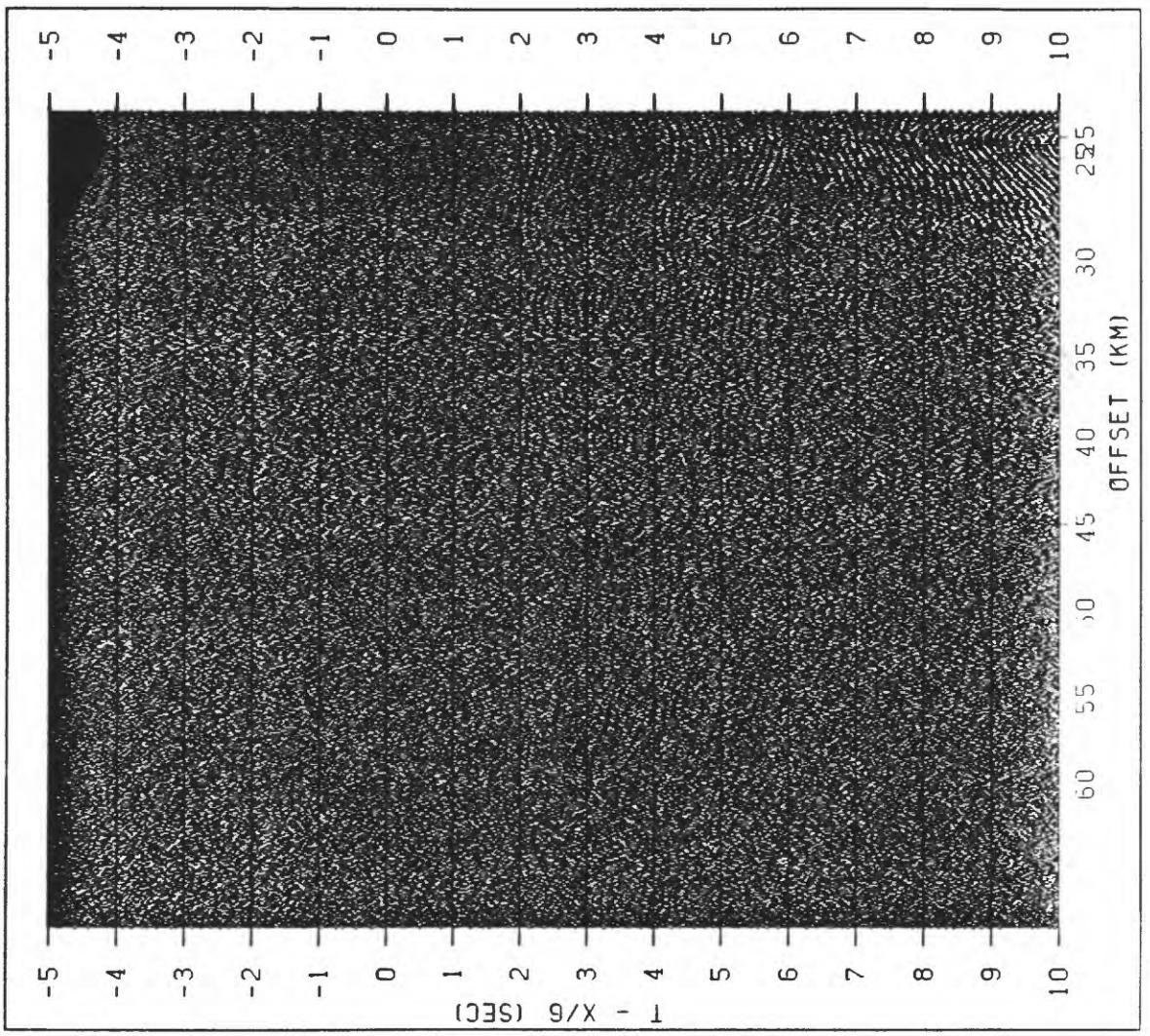


FIG. A-009. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 009
LINE 01Y - GATHER 09 / STATION 2400

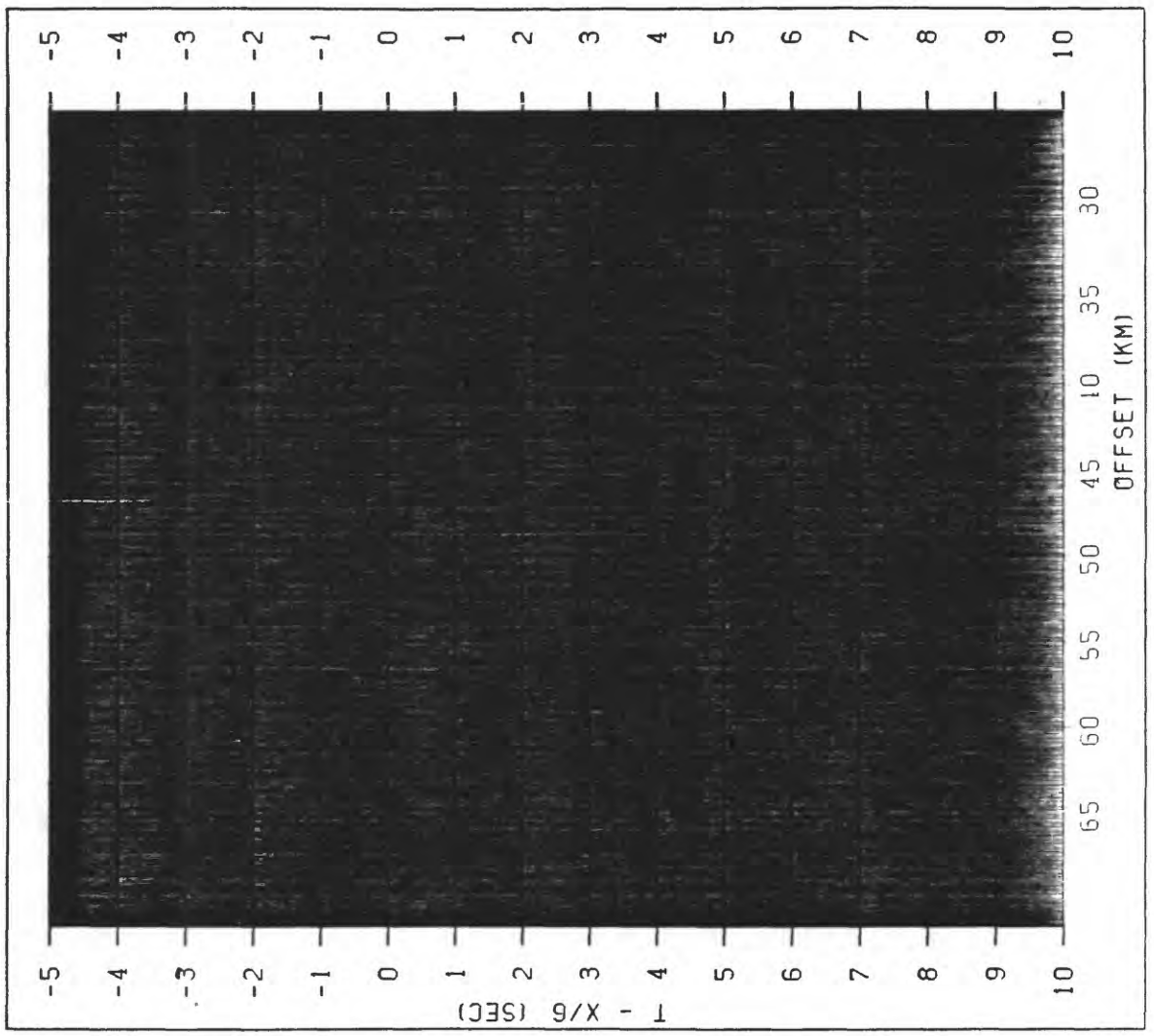


FIG. A-010. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 010
LINE 01Y - GATHER 10 / STATION 2370

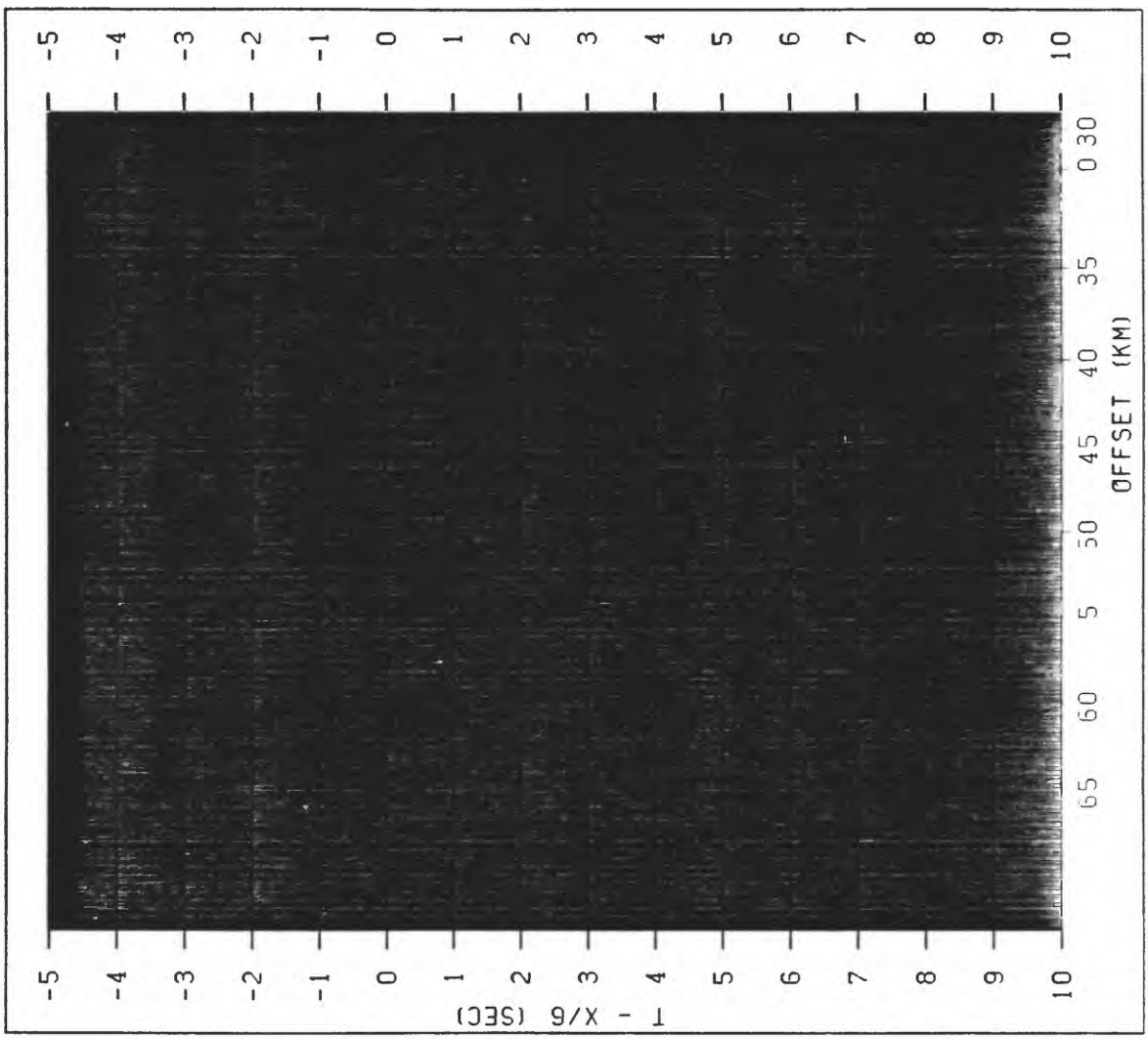


FIG. A-011. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 011
LINE 01Y - GATHER 11 / STATION 2355

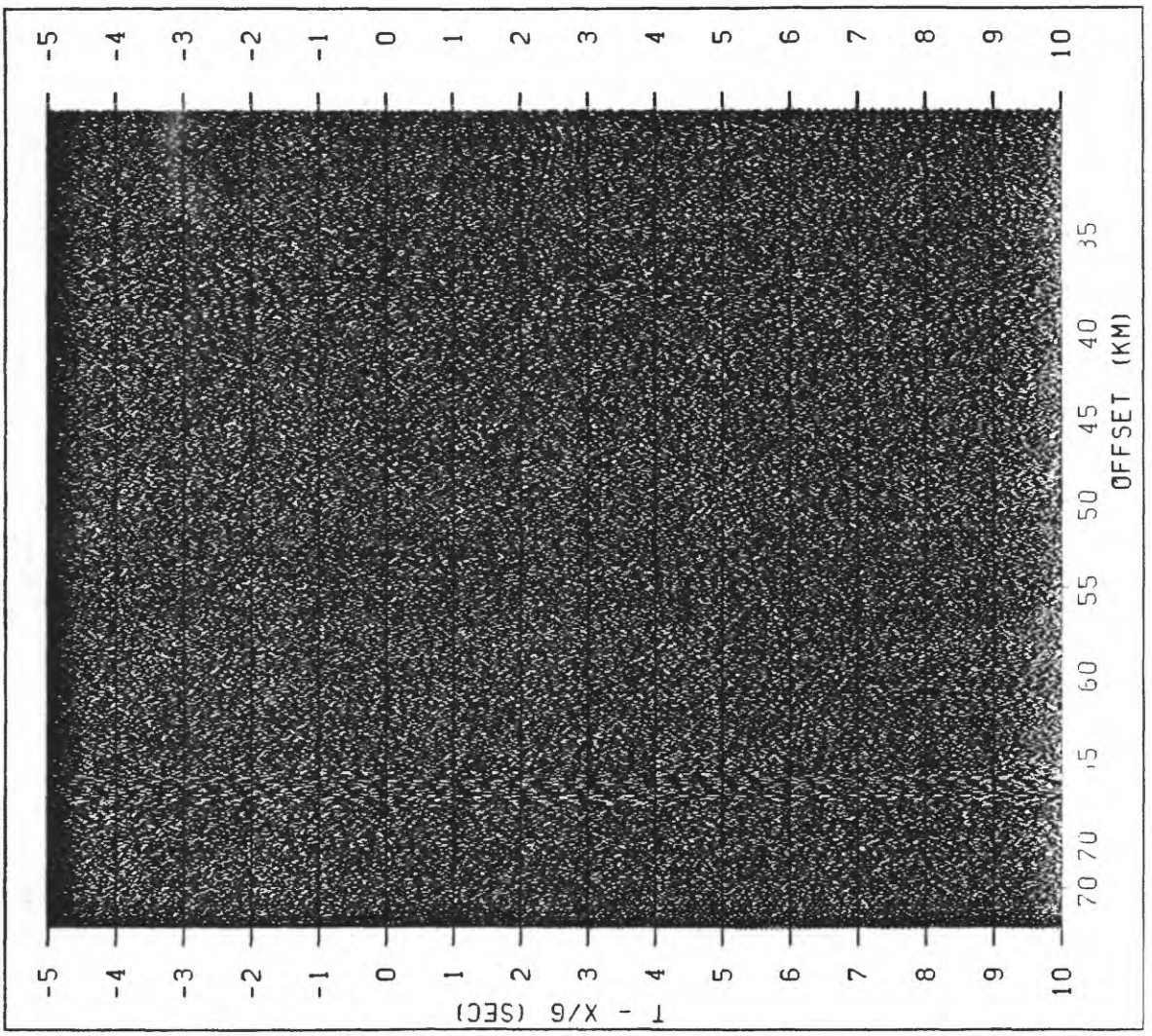


FIG. A-012. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 012
LINE 01Y - GATHER 12 / STATION 2340

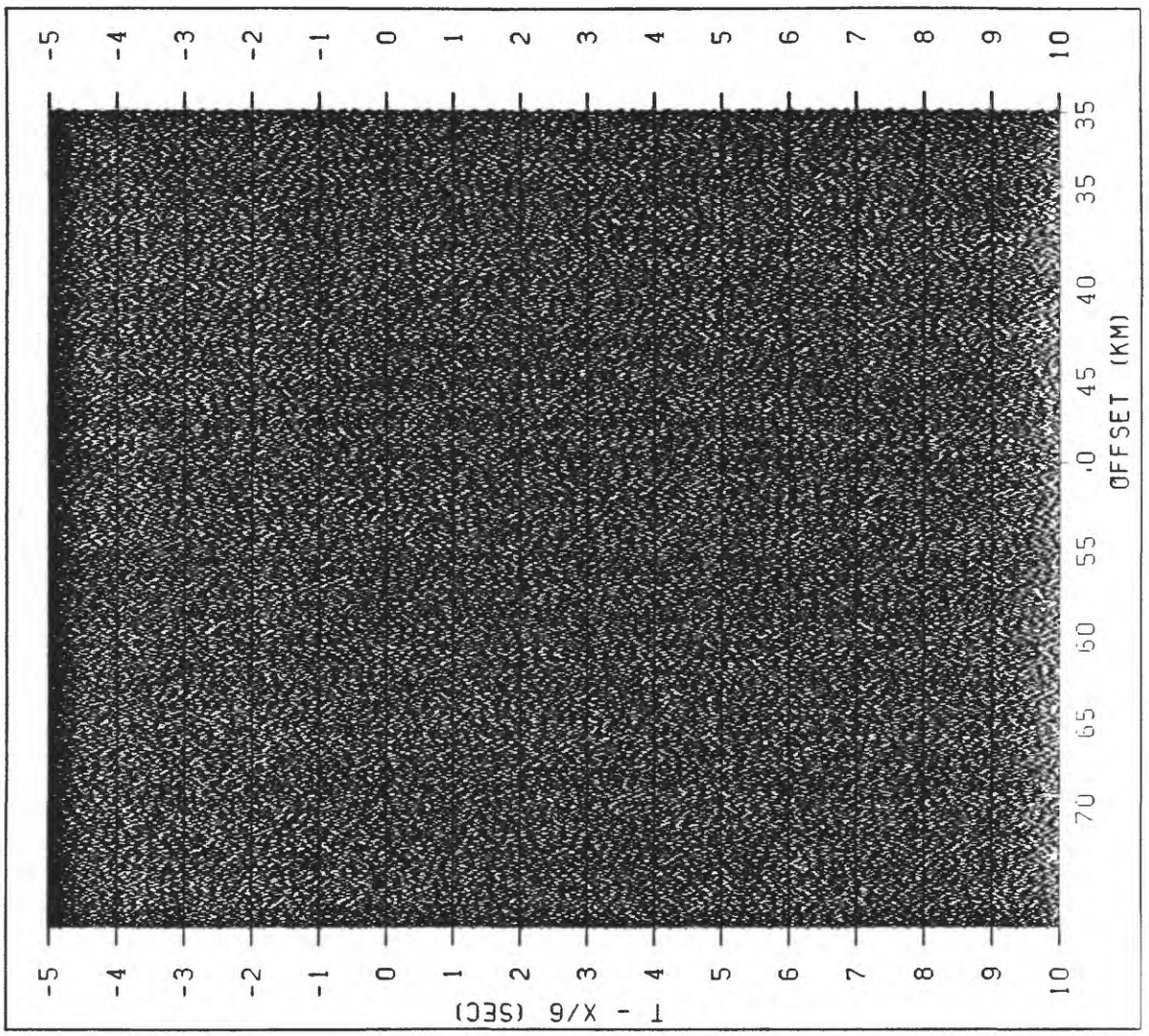


FIG. A-013. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 013
LINE 01Y - GATHER 13 / STATION 2315

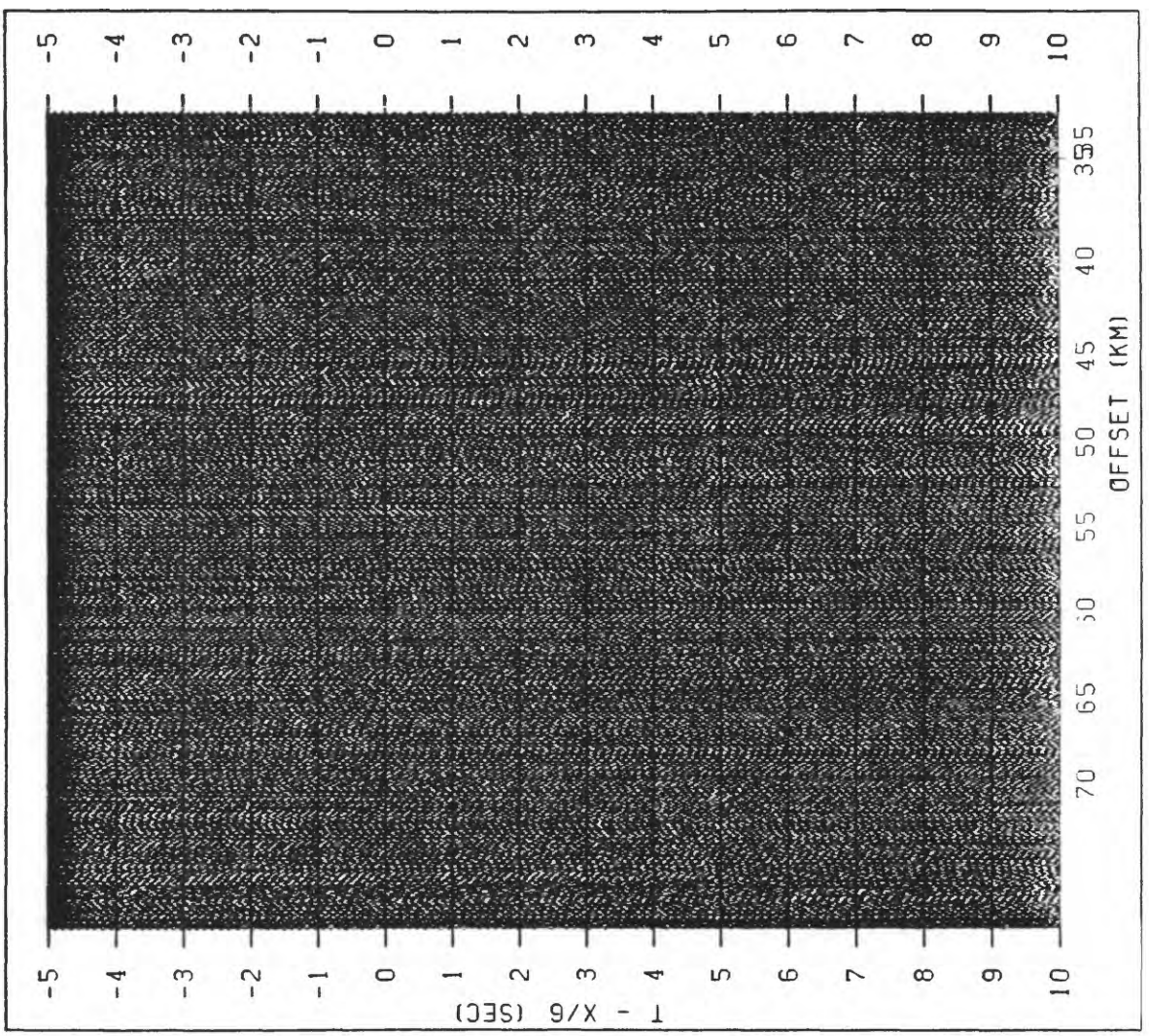


FIG. A-014. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 014
LINE 01Y - GATHER 14 / STATION 2300

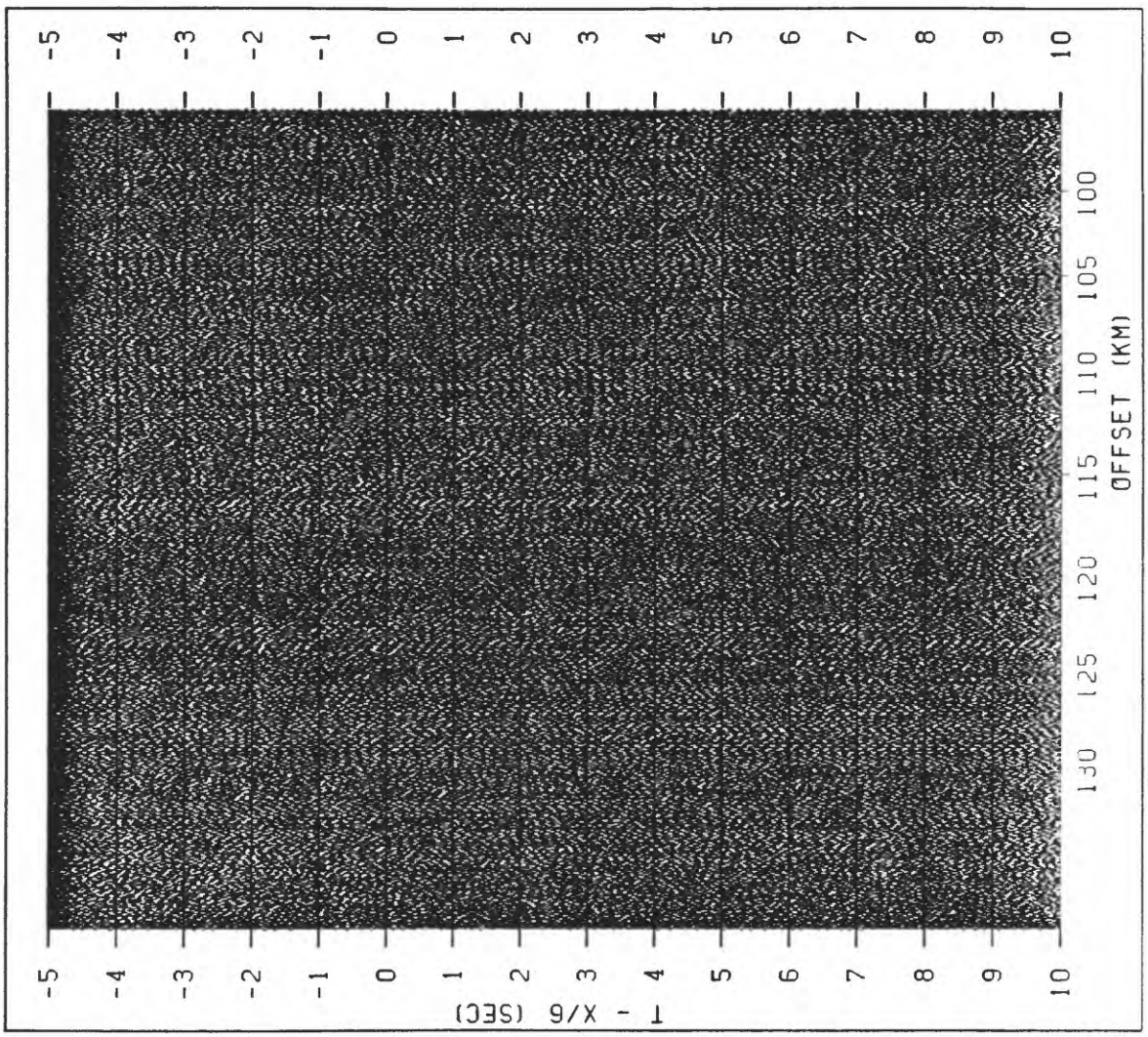


FIG. A-015. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 015
LINE 01Y - GATHER 15 / STATION 7022

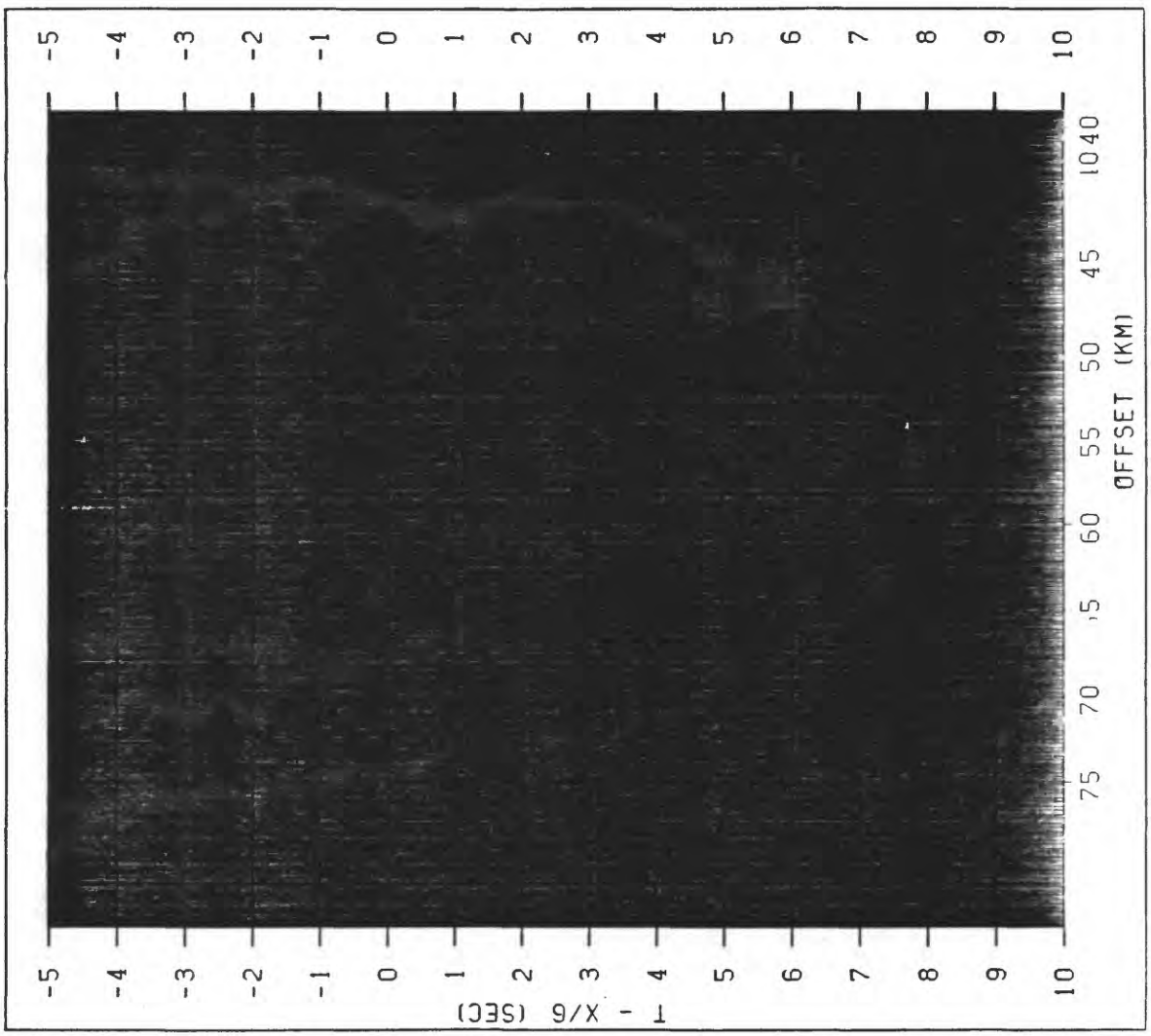


FIG. A-016. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 016
LINE 01Y - GATHER 16 / STATION 2255

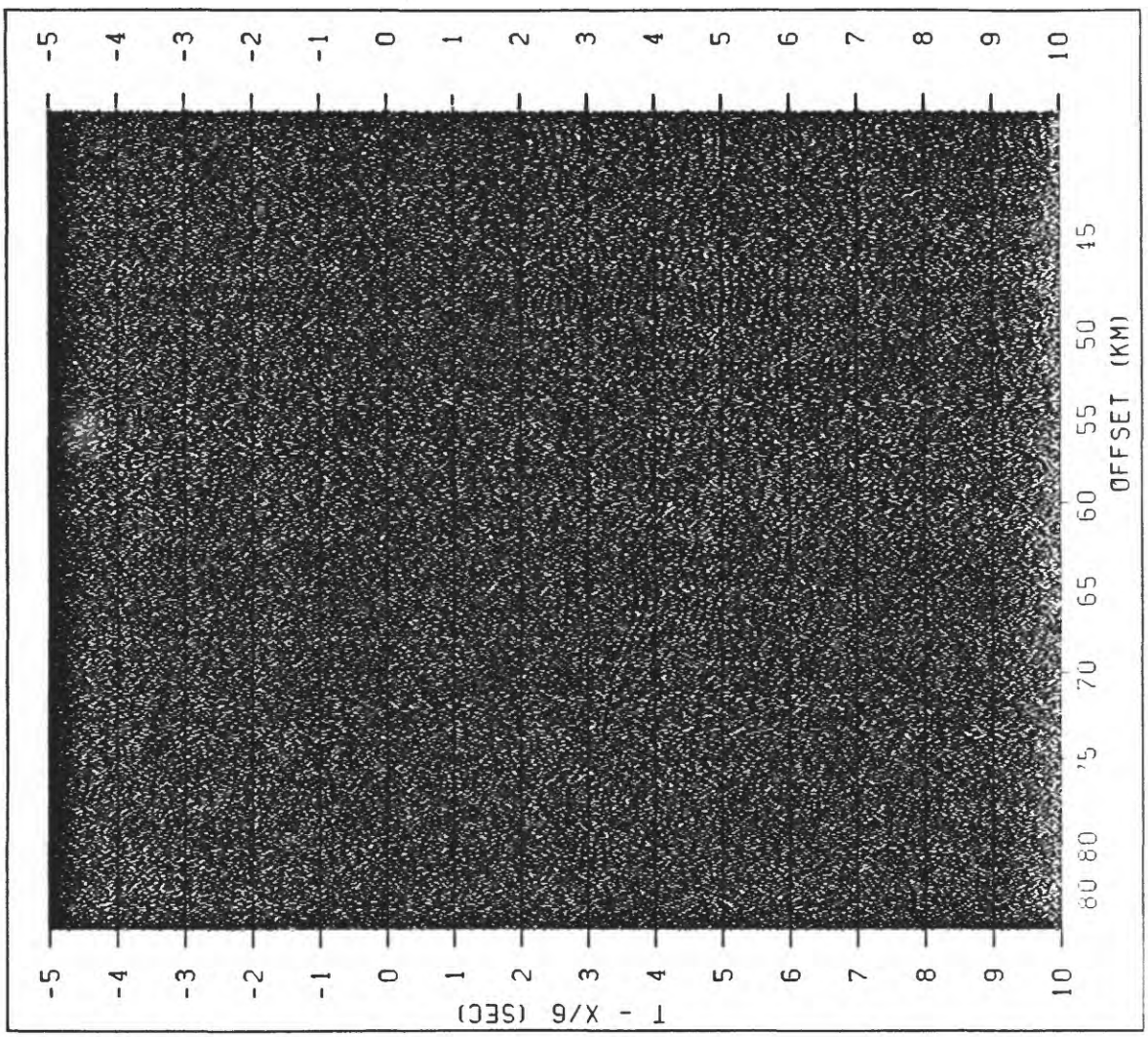


FIG. A-017. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 017
LINE 01Y - GATHER 17 / STATION 2240

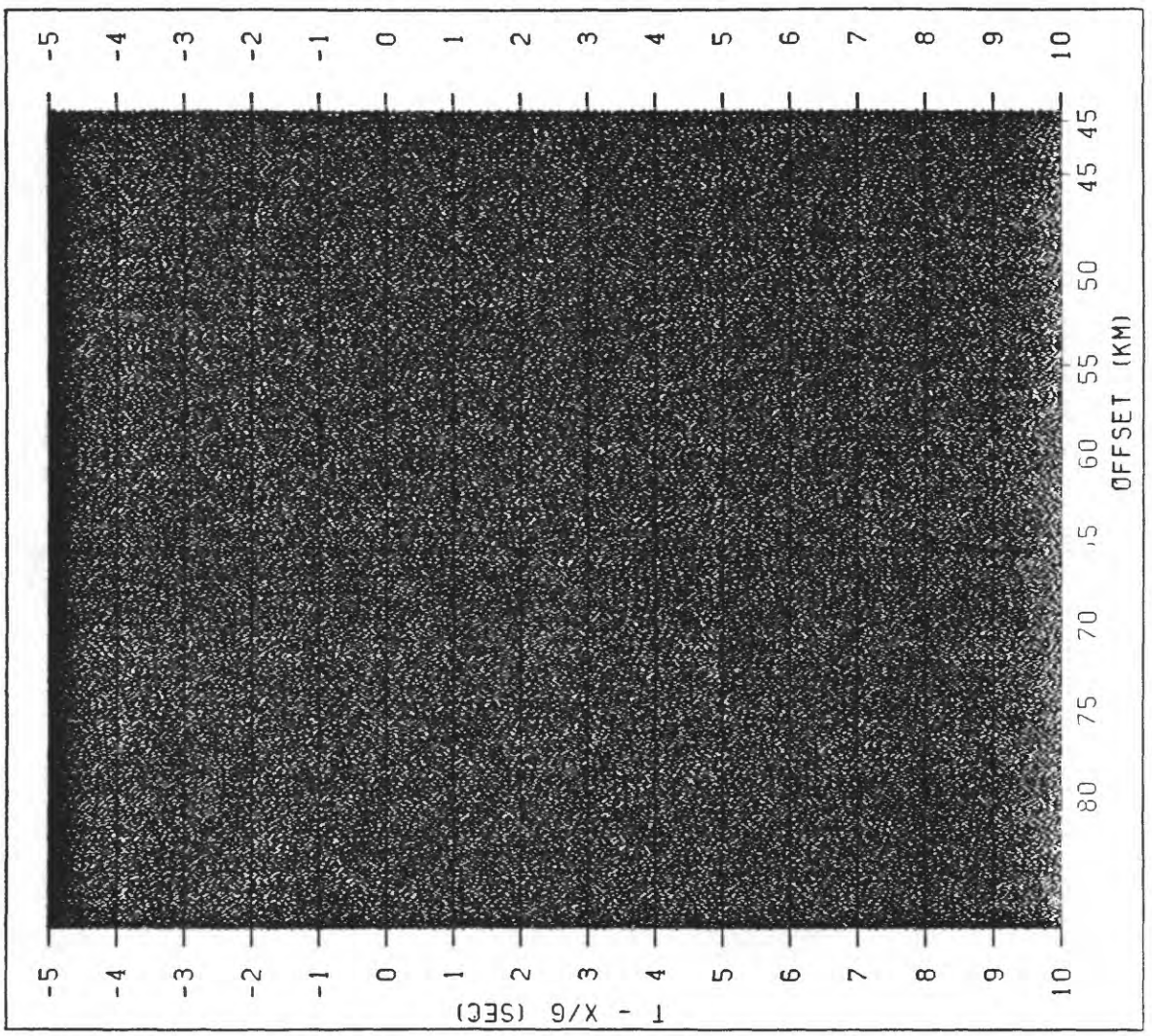


FIG. A-018. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 018
LINE 01Y - GATHER 18 / STATION 2210

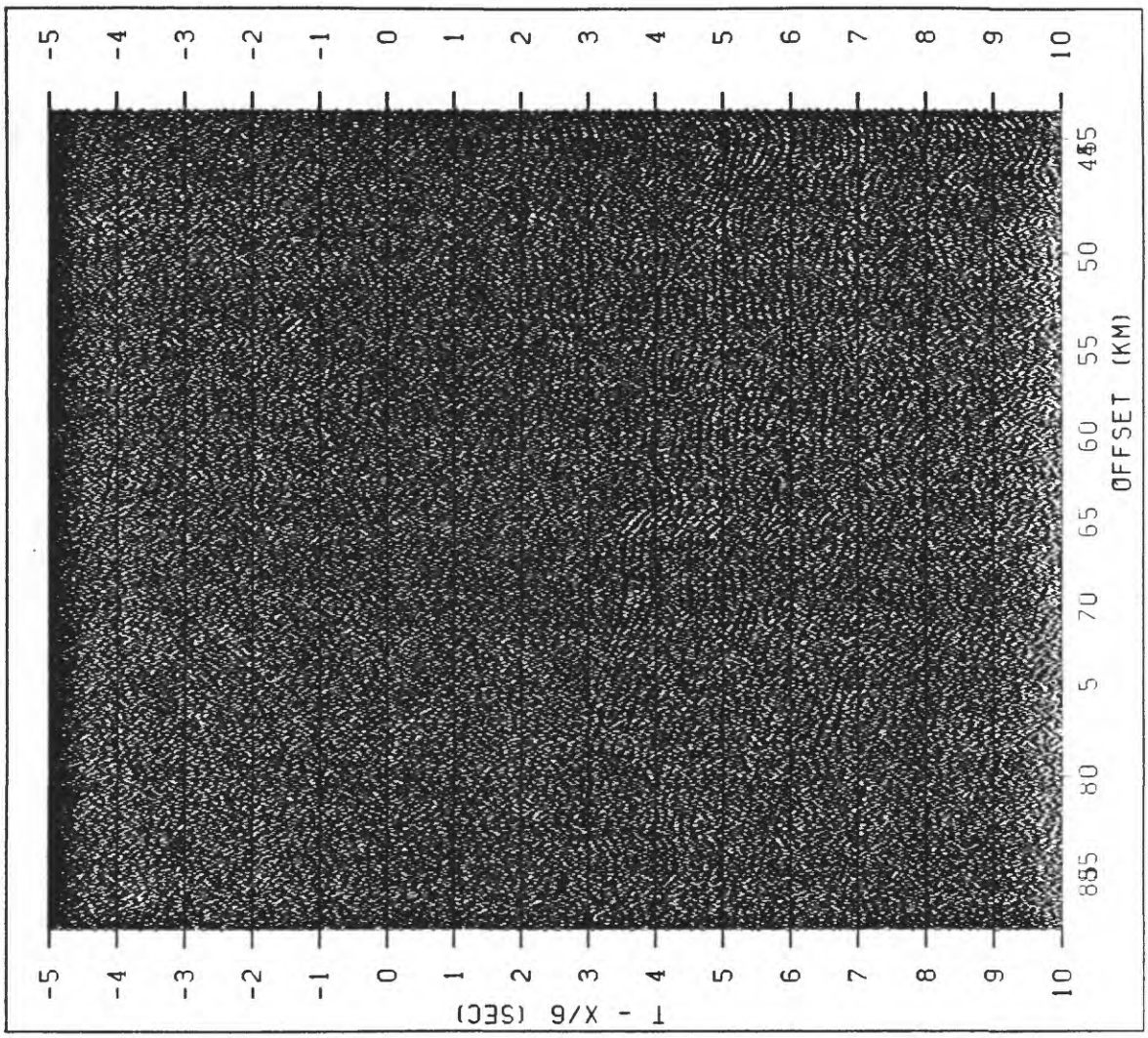


FIG. A-019. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 019
LINE 01Y - GATHER 19 / STATION 2200

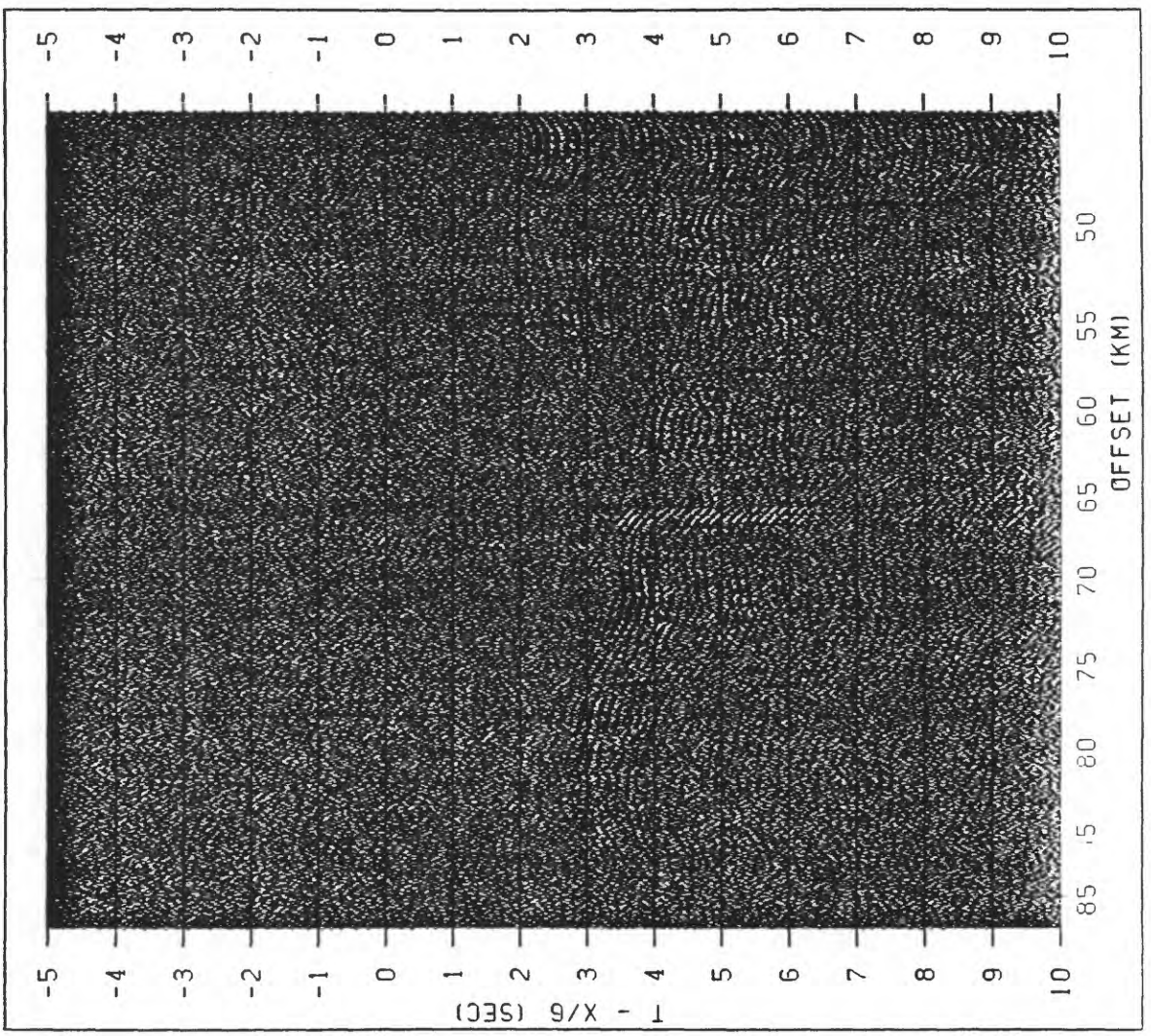


FIG. A-020. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 020
LINE 01Y - GATHER 20 / STATION 2185

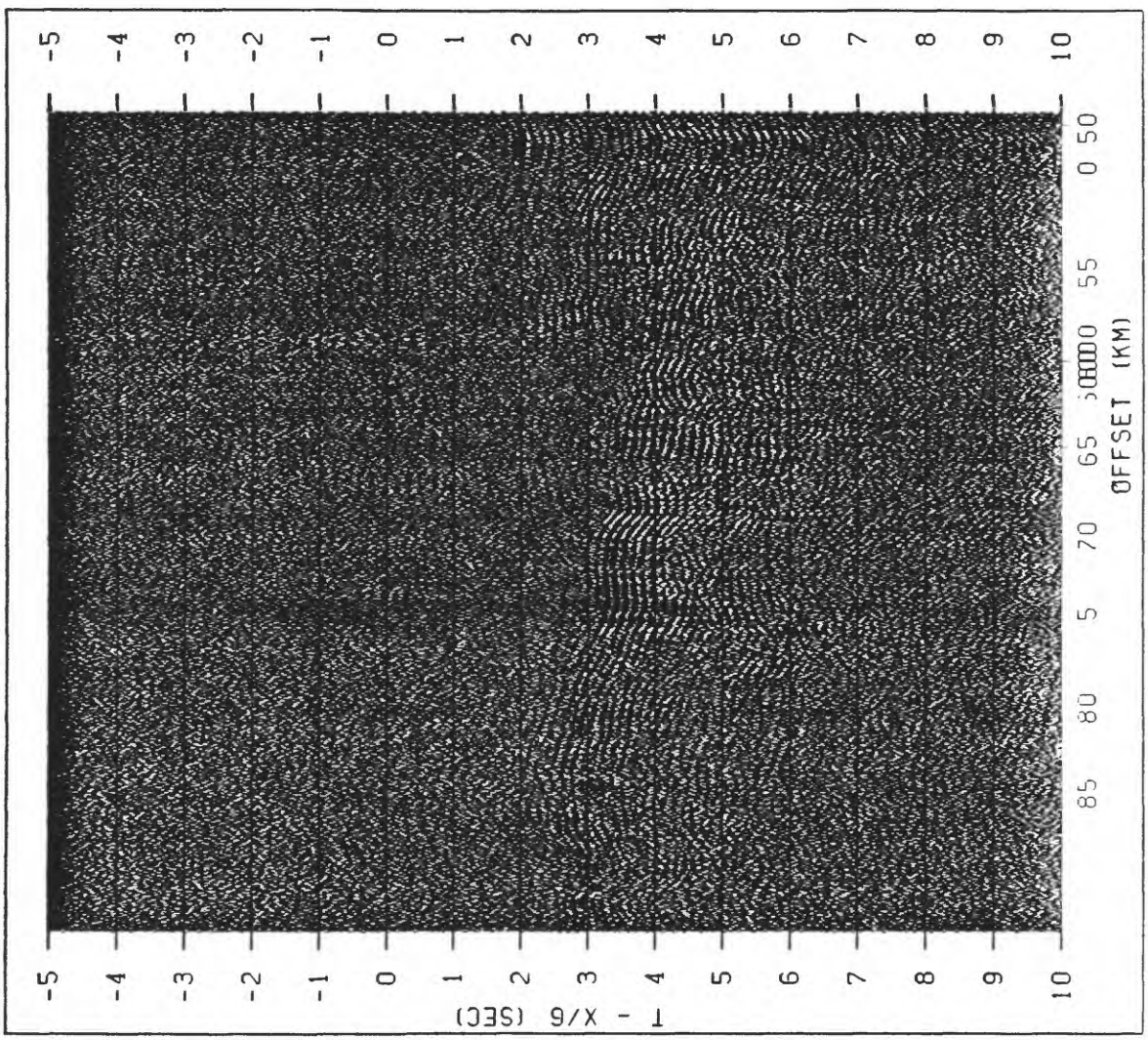


FIG. A-021. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 021
LINE 01Y - GATHER 21 / STATION 2160

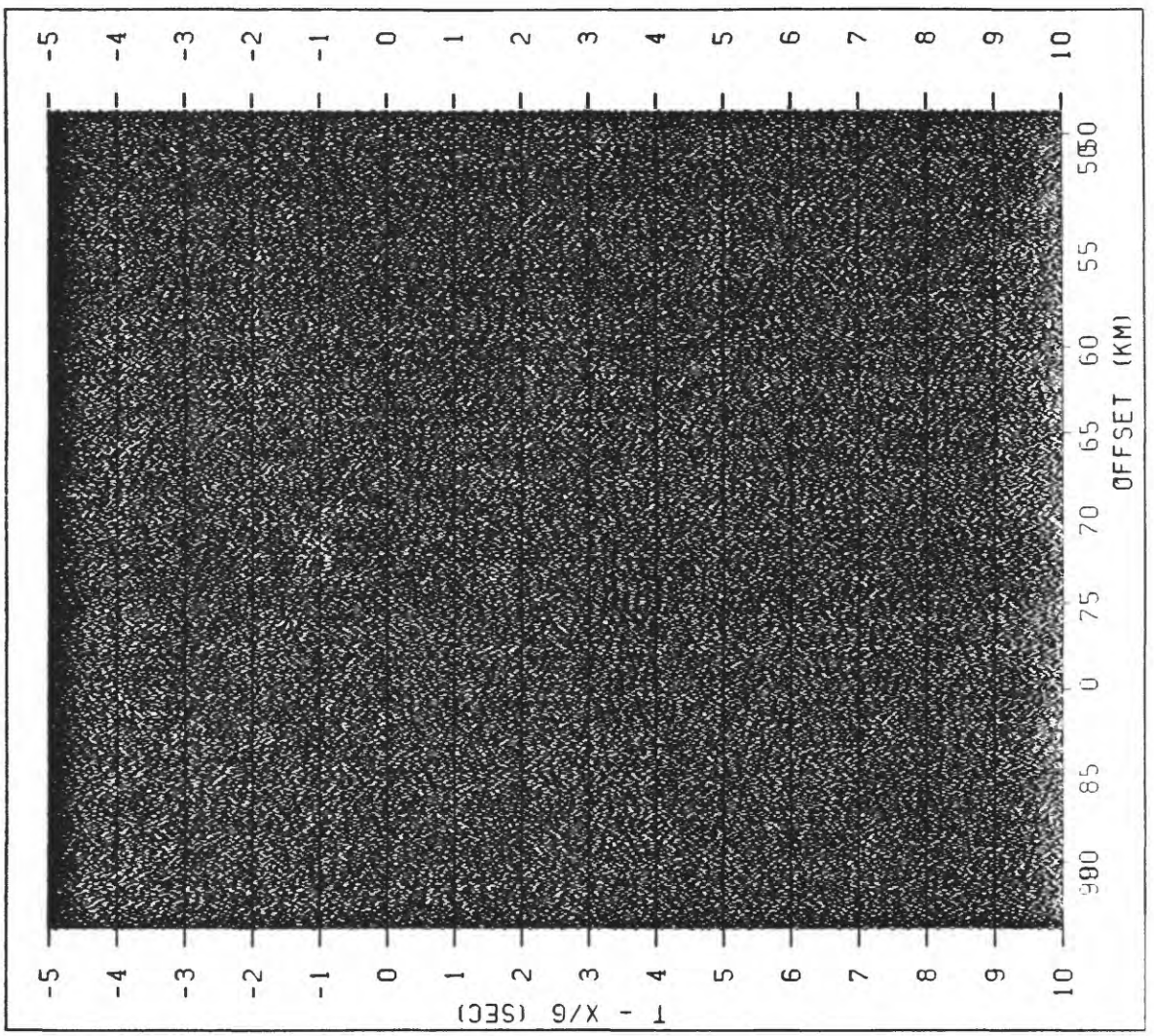


FIG. A-022. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 022
LINE 01Y - GATHER 22 / STATION 2150

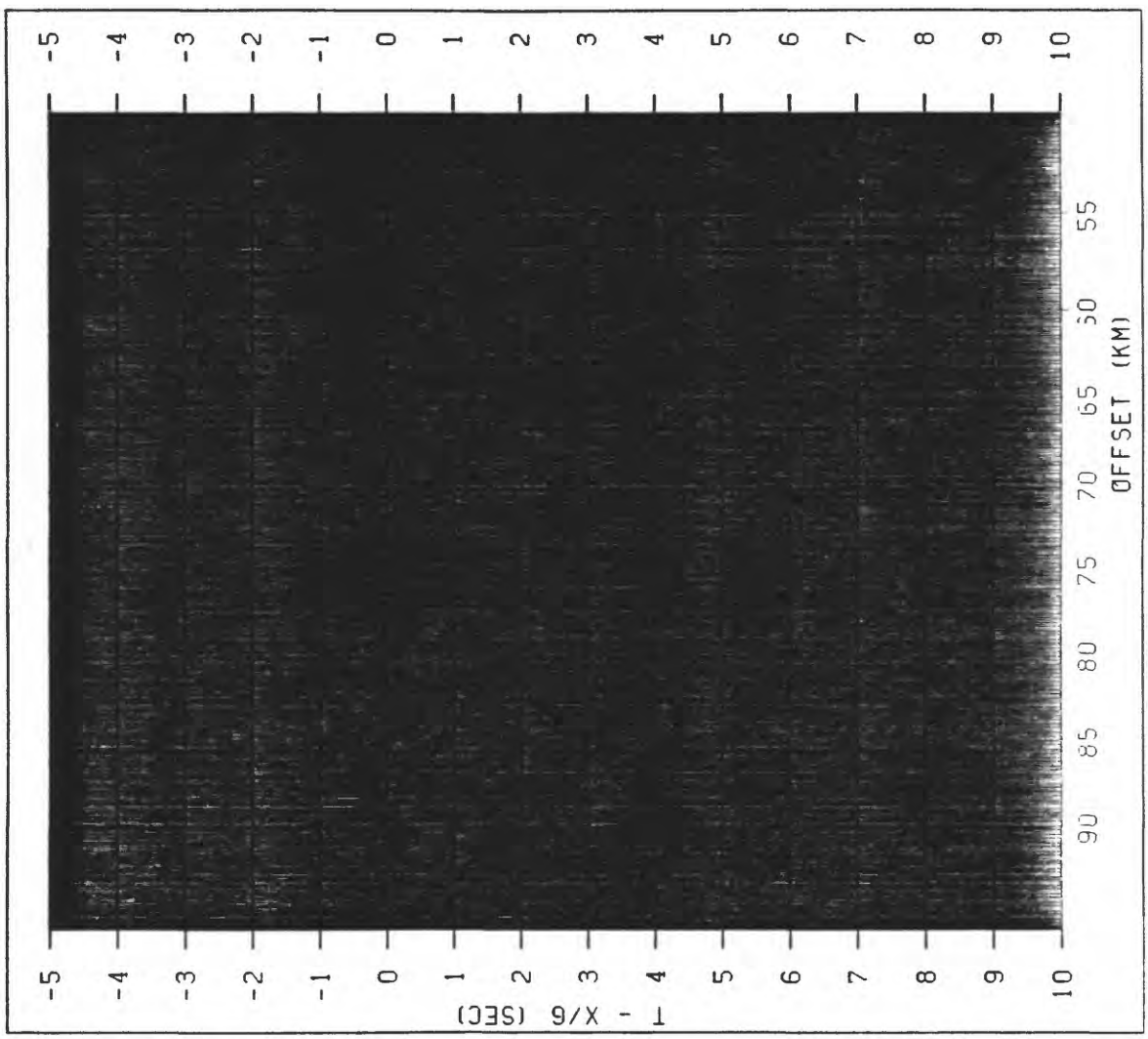


FIG. A-023. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 023
LINE 01Y - GATHER 23 / STATION 2130

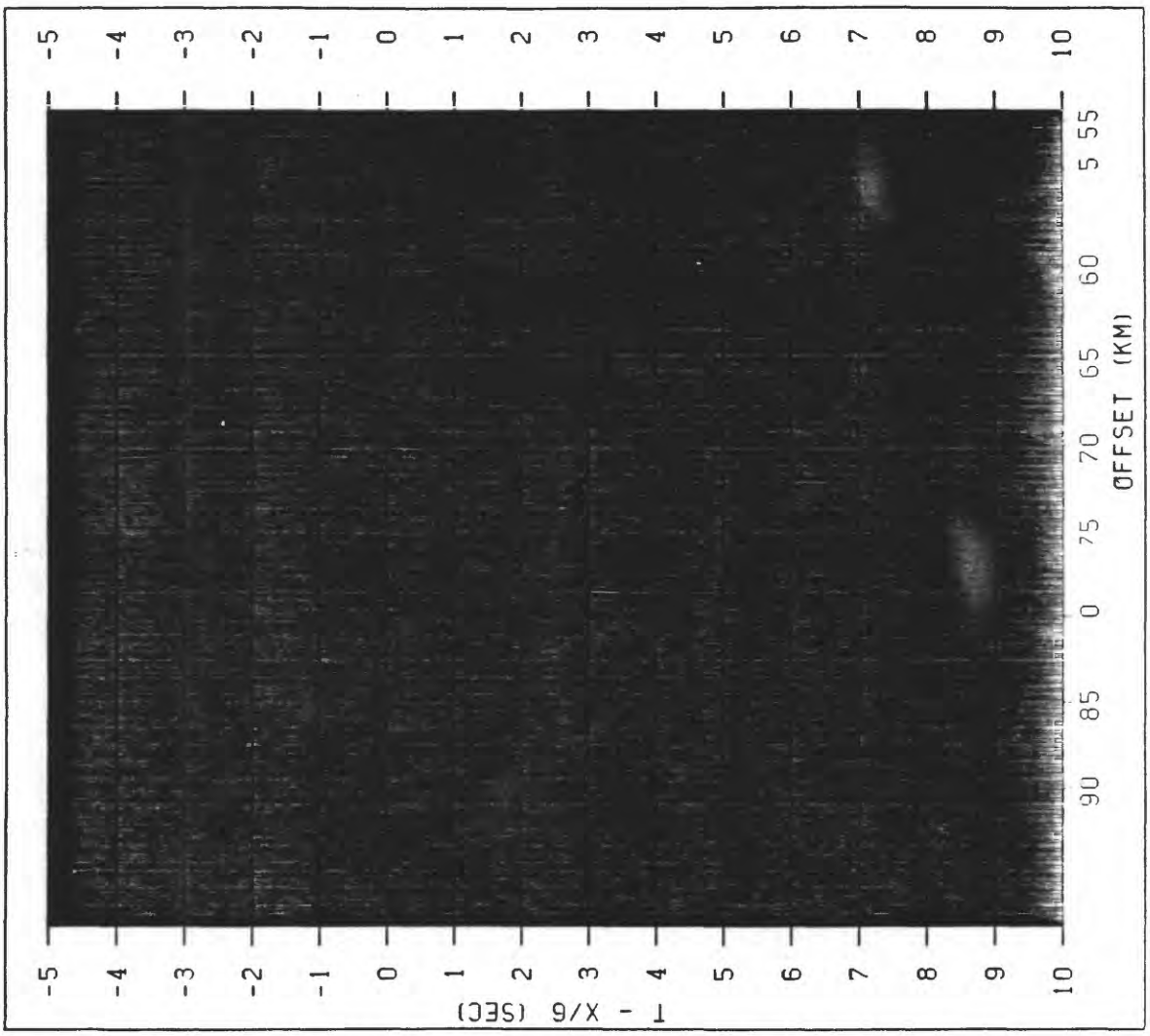


FIG. A-024. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 024
LINE 01Y - GATHER 24 / STATION 2109

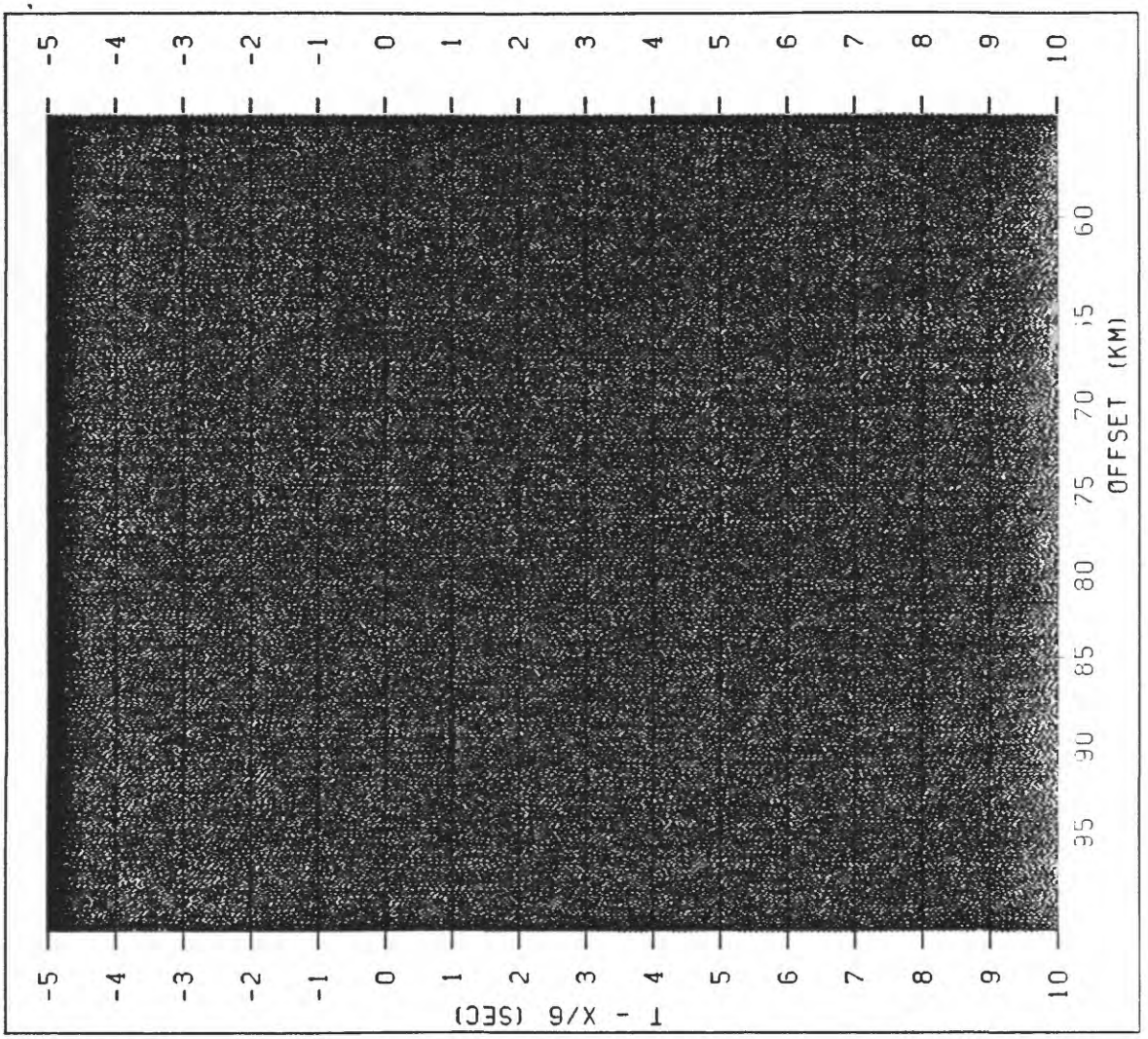


FIG. A-025. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 025
LINE 01Y - GATHER 25 / STATION 2080

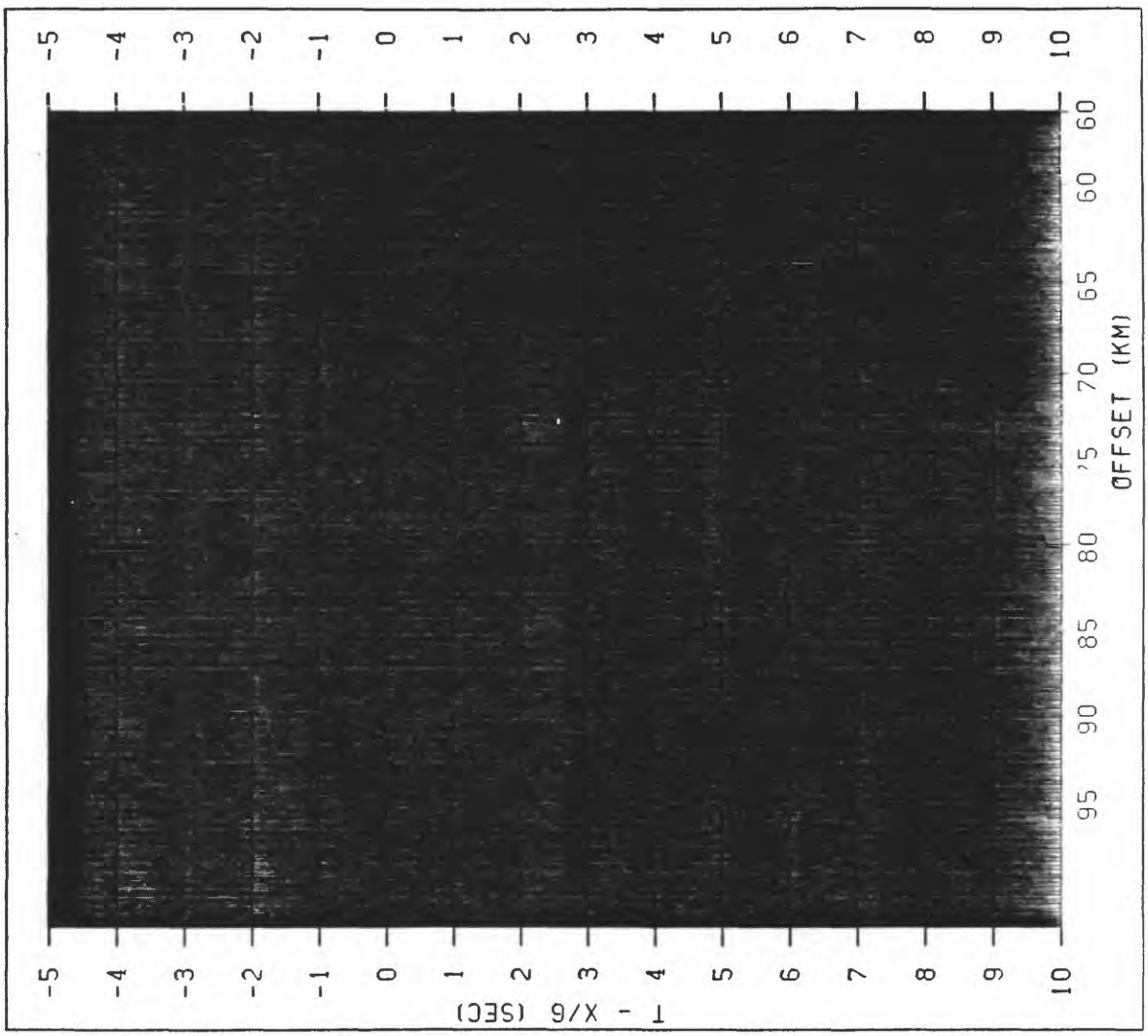


FIG. A-026. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 026
LINE 01Y - GATHER 26 / STATION 2065

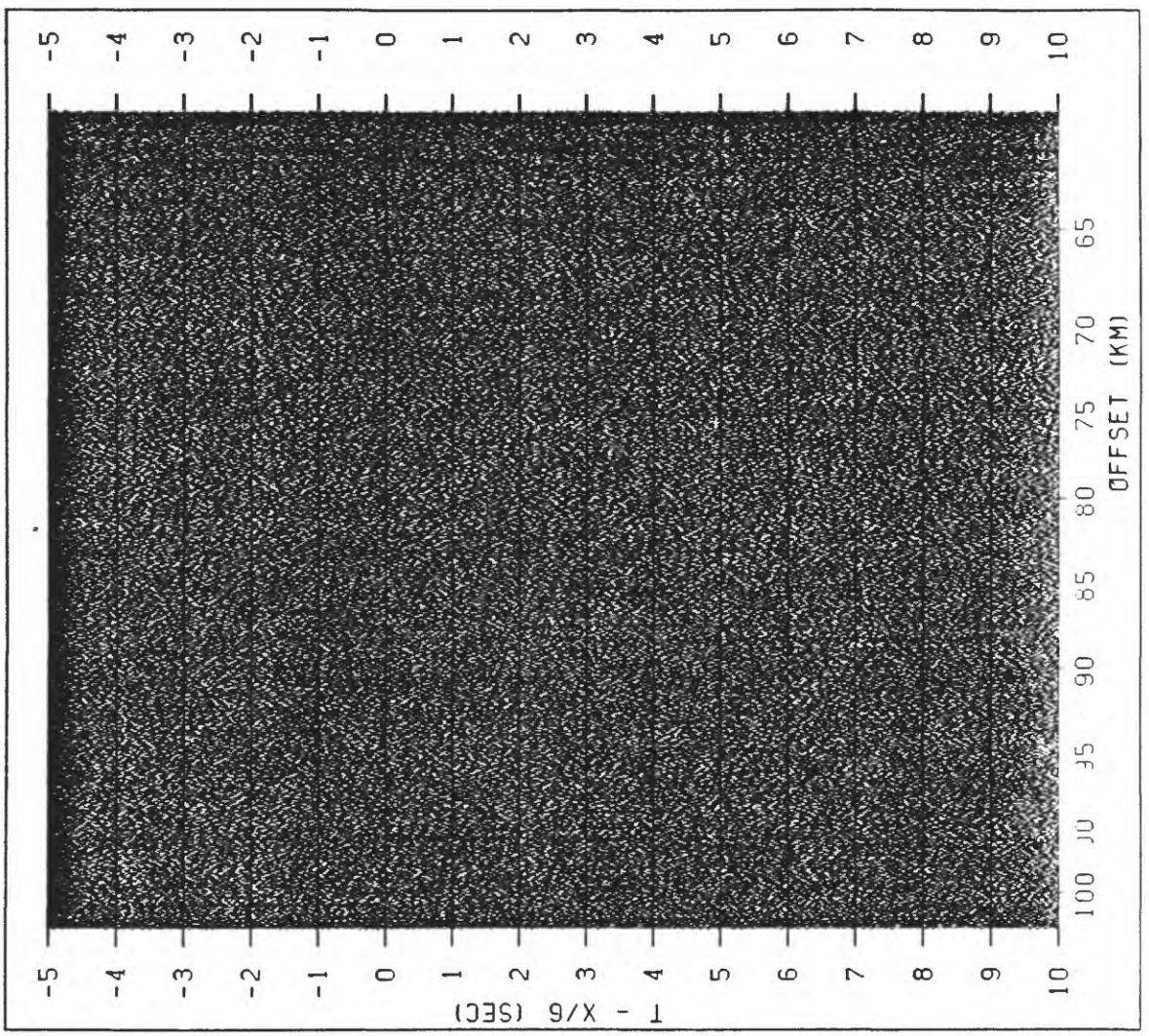


FIG. A-027. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 027
LINE 01Y - GATHER 27 / STATION 2039

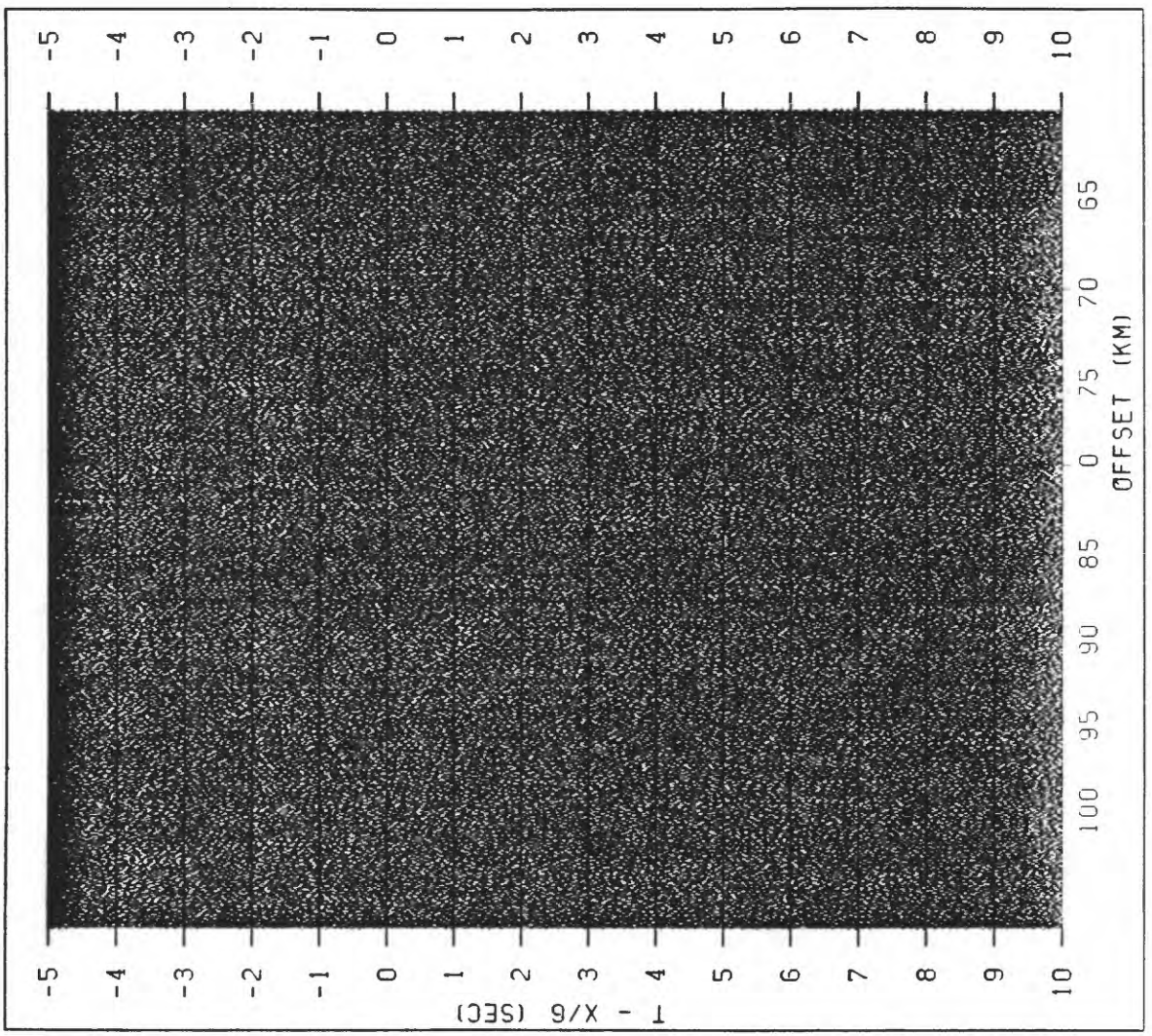


FIG. A-028. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 028
LINE 01Y - GATHER 28 / STATION 2020

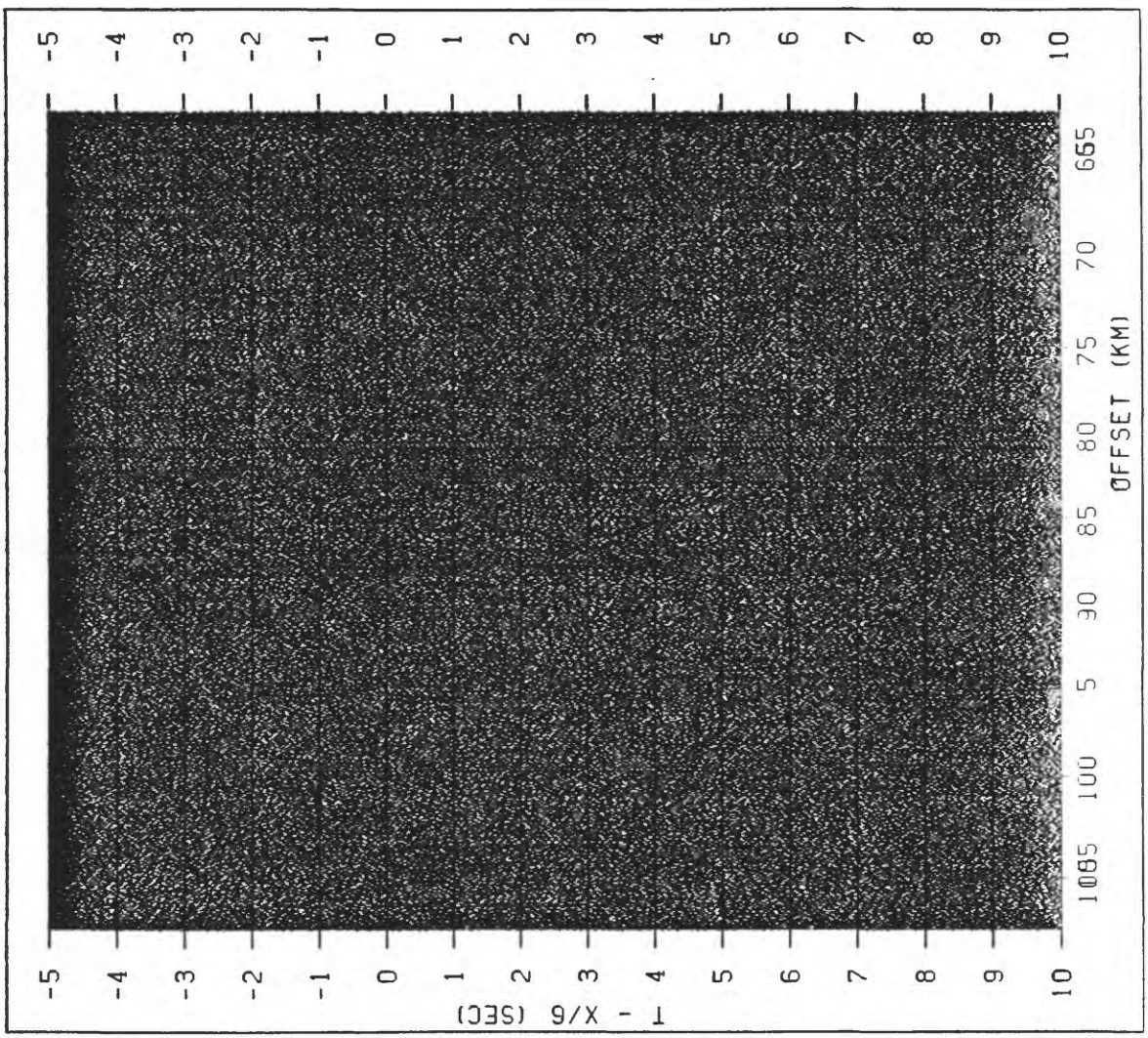


FIG. A-029. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 029
LINE 01Y - GATHER 29 / STATION 2000

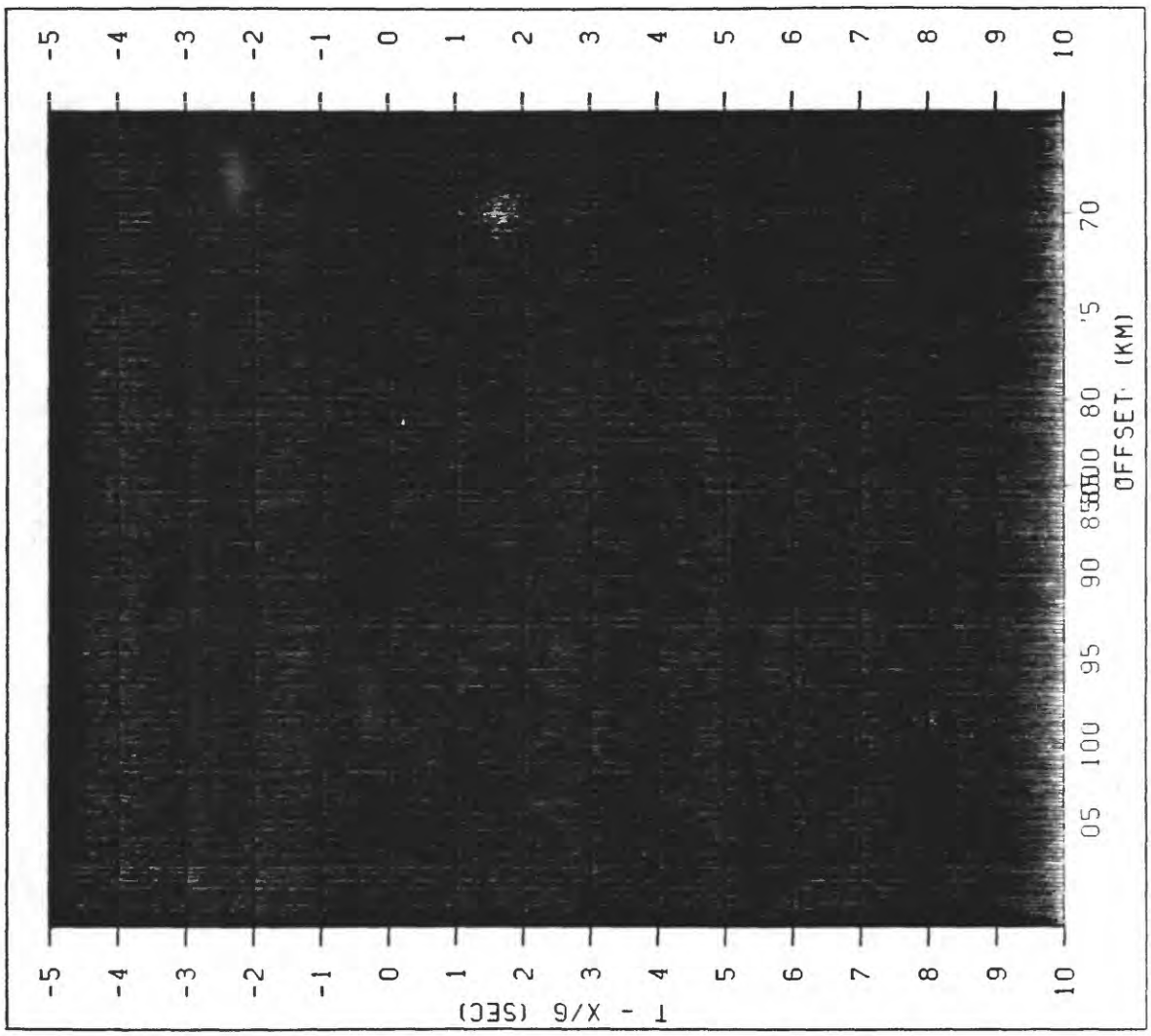


FIG. A-030. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 030
LINE 01Y - GATHER 30 / STATION 0020

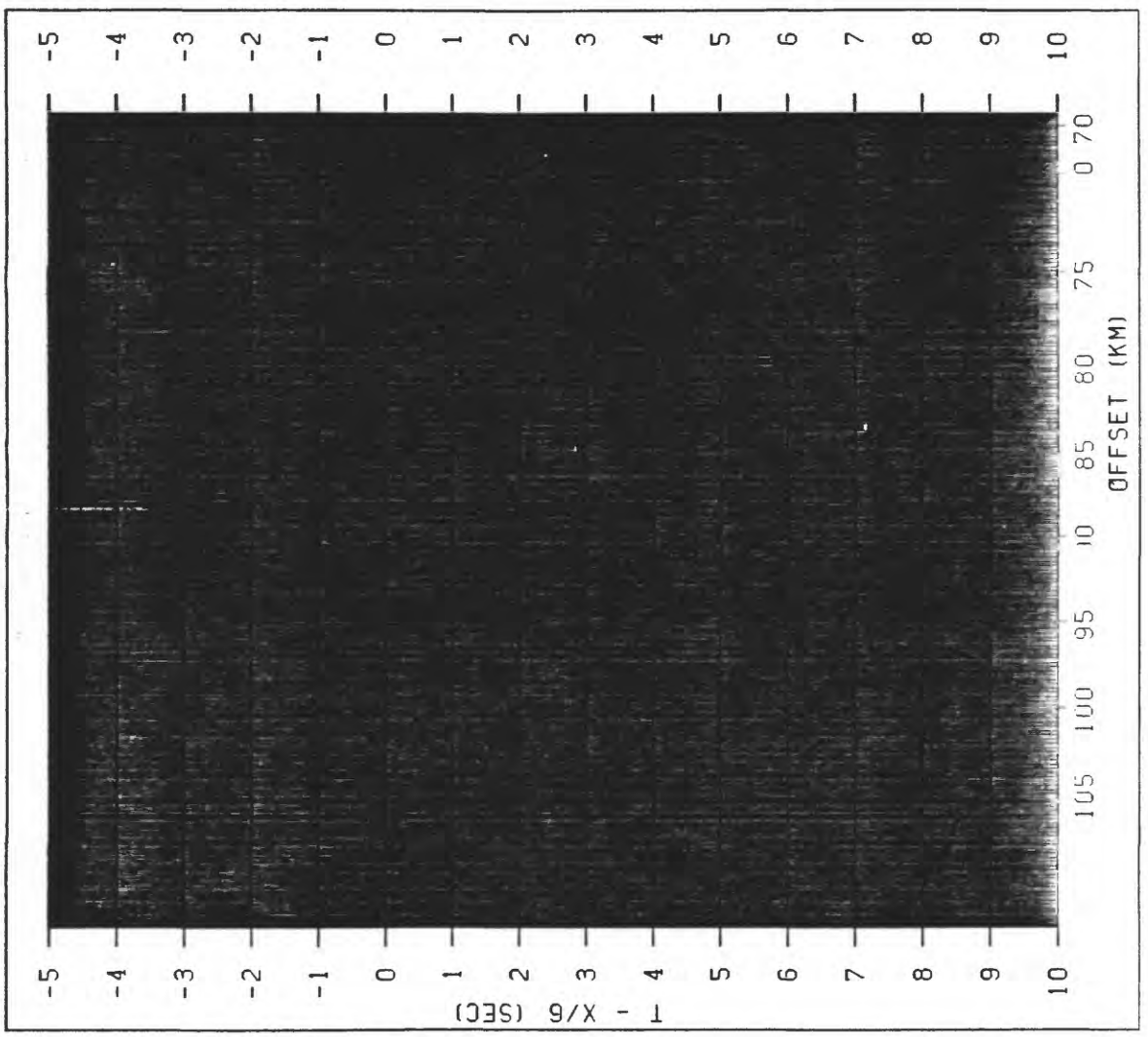


FIG. A-031. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 04 / OVERALL GATHER 031
LINE 01Y - GATHER 31 / STATION 0042

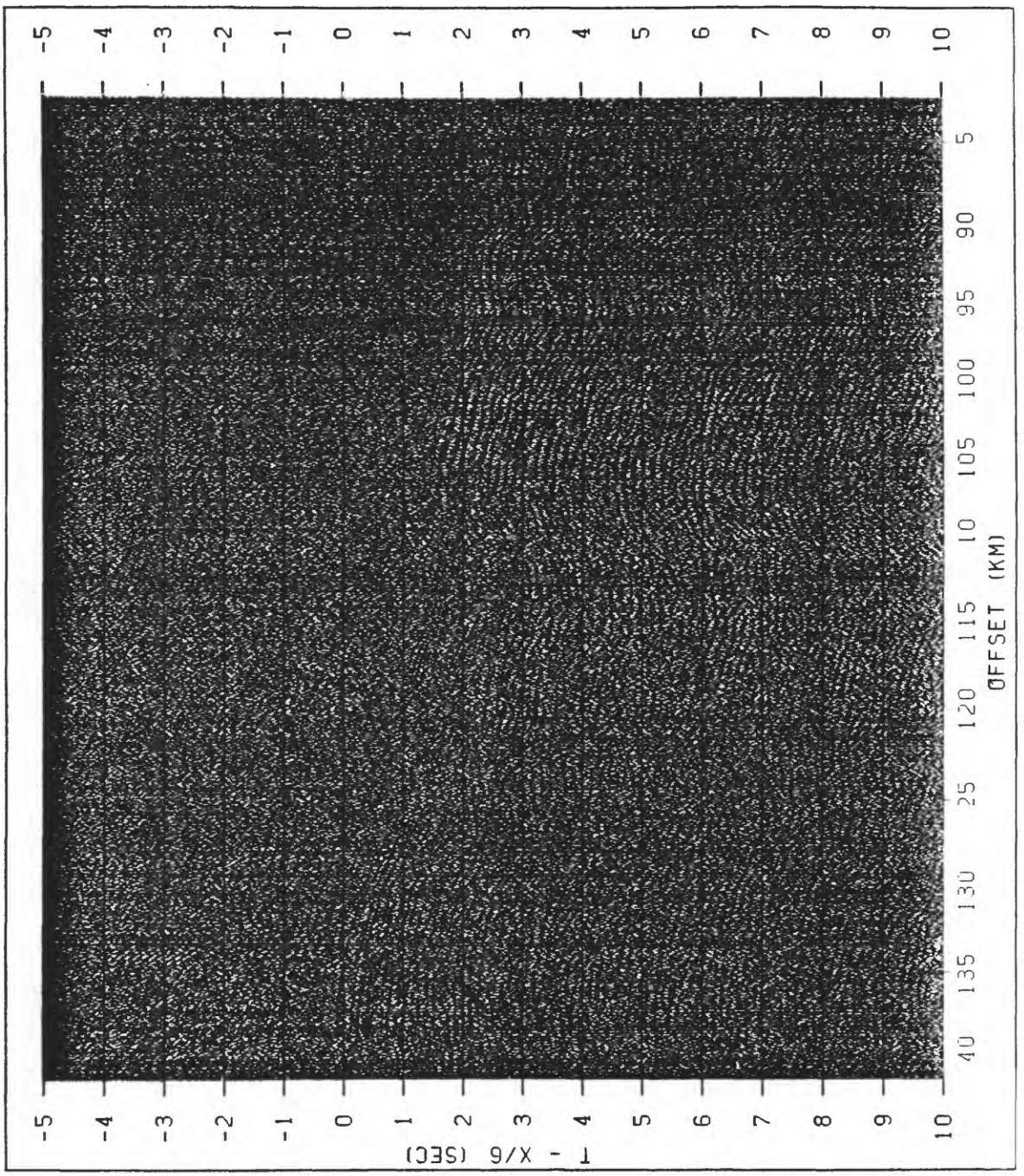


FIG. A-032. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 032
LINE 01B - GATHER 32 / STATION 0060

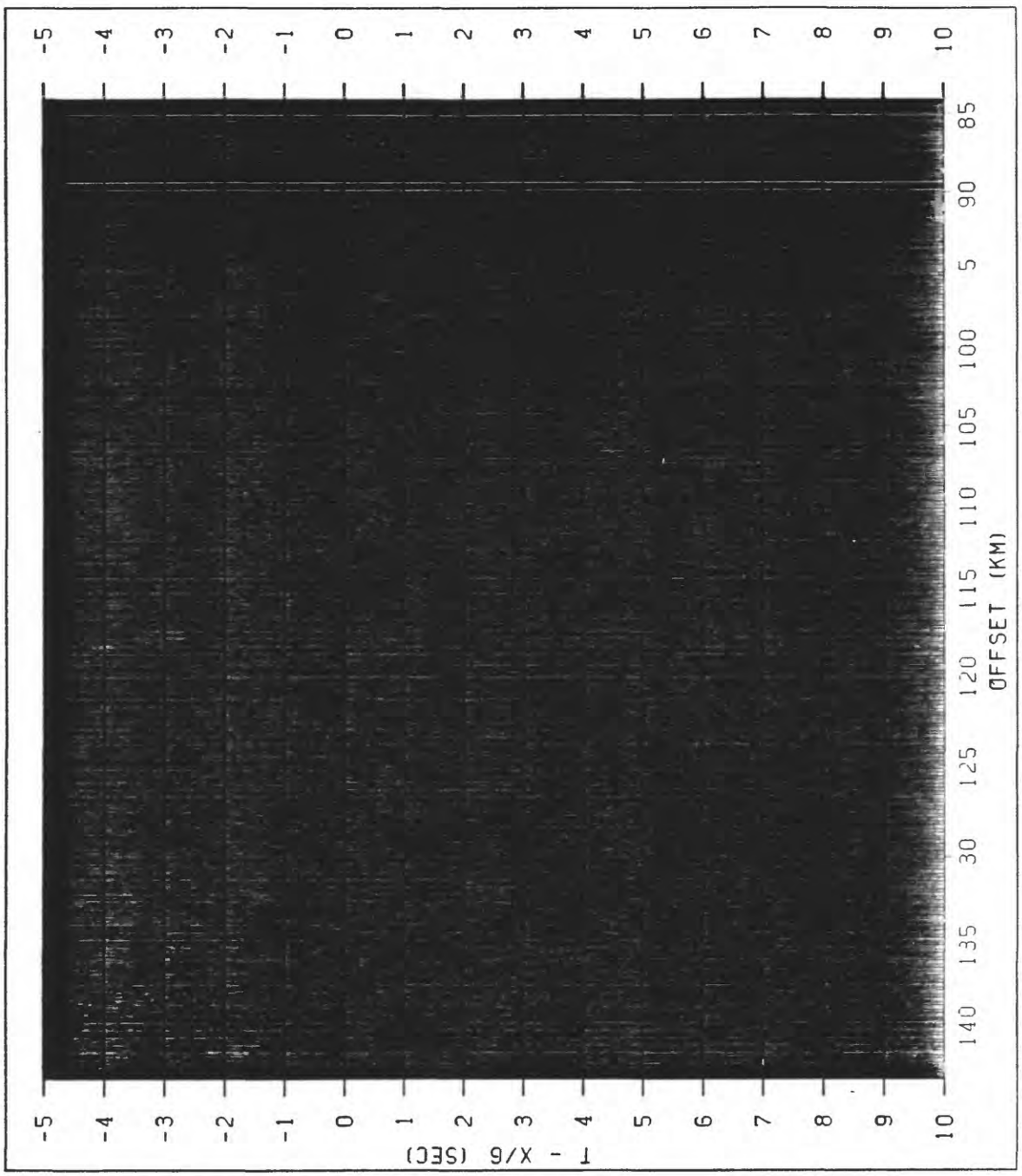


FIG. A-033. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 033
LINE 01B - GATHER 33 / STATION 0080

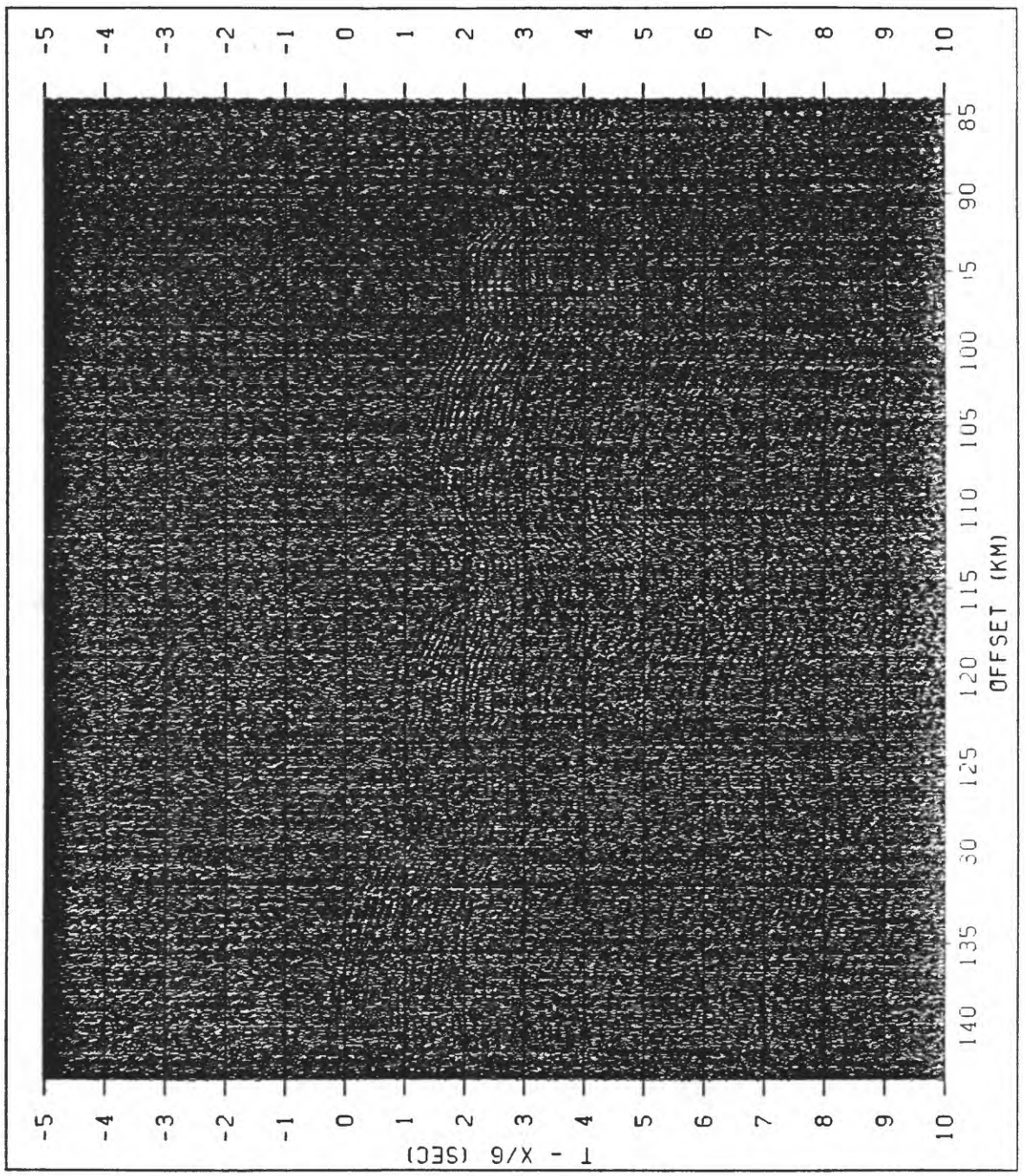


FIG. A-034. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 034
LINE 01B - GATHER 34 / STATION 0080

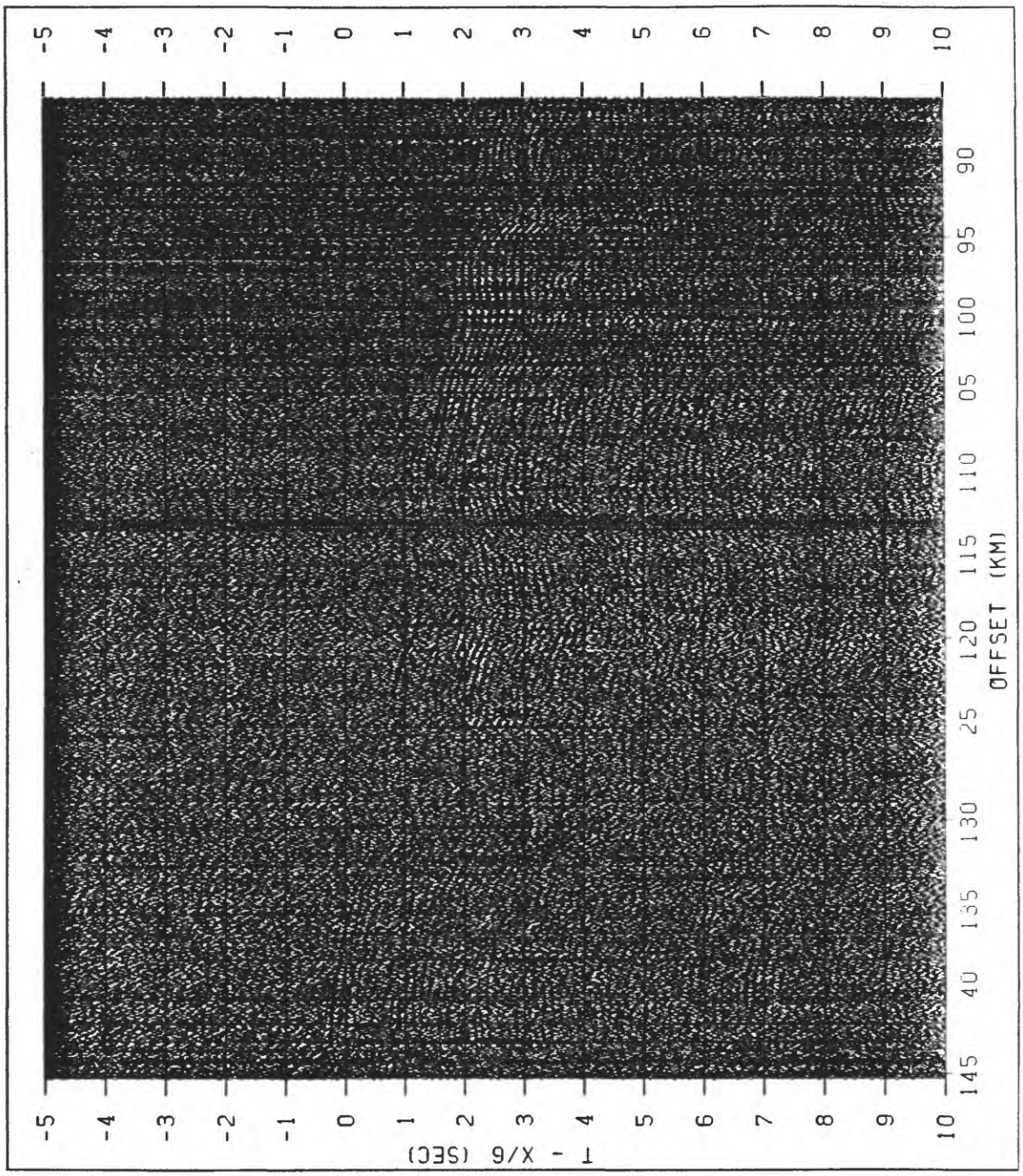


FIG. A-035. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 035
LINE 01B - GATHER 35 / STATION 0100

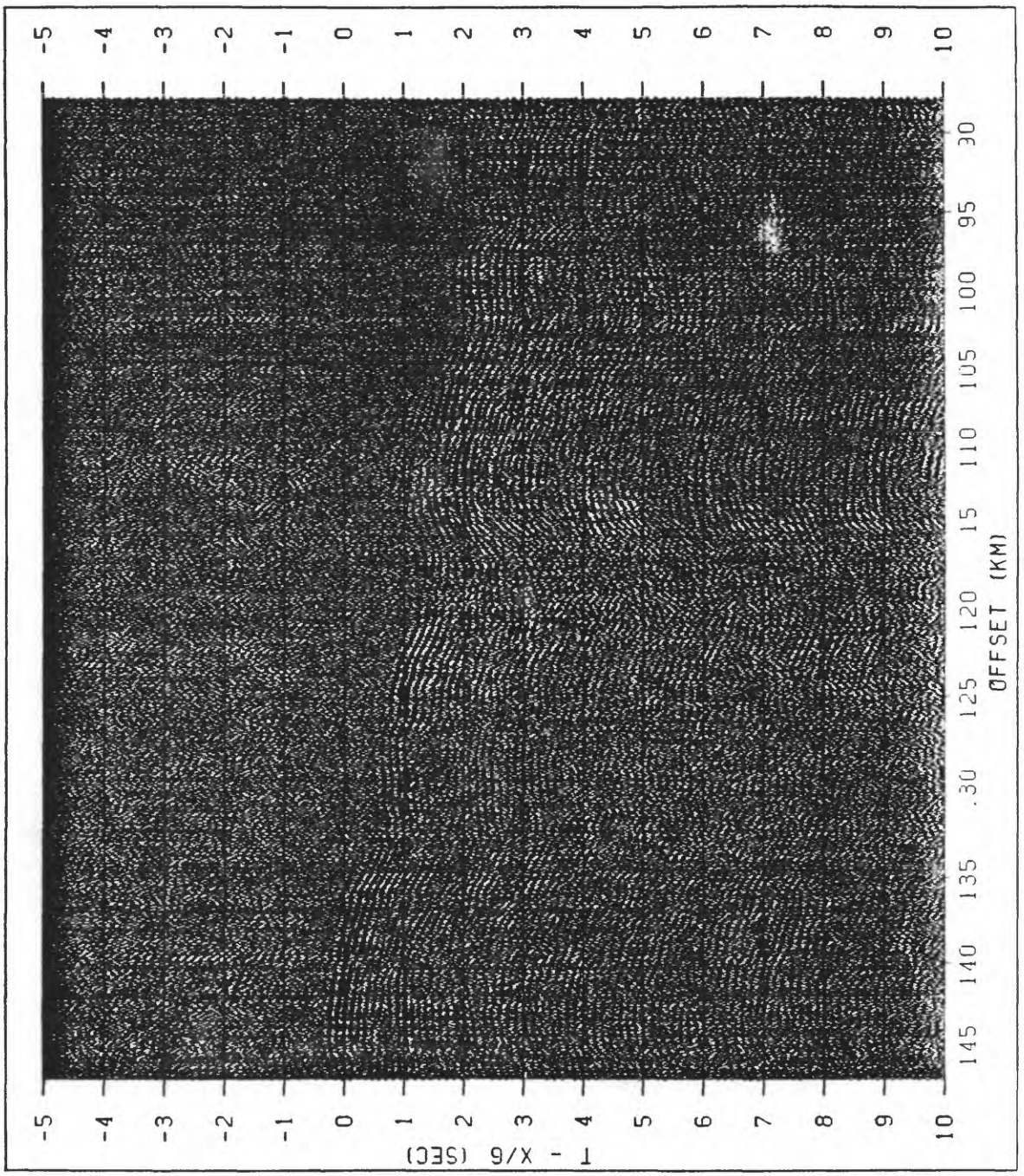


FIG. A-036. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 036
LINE 01B - GATHER 36 / STATION 0118

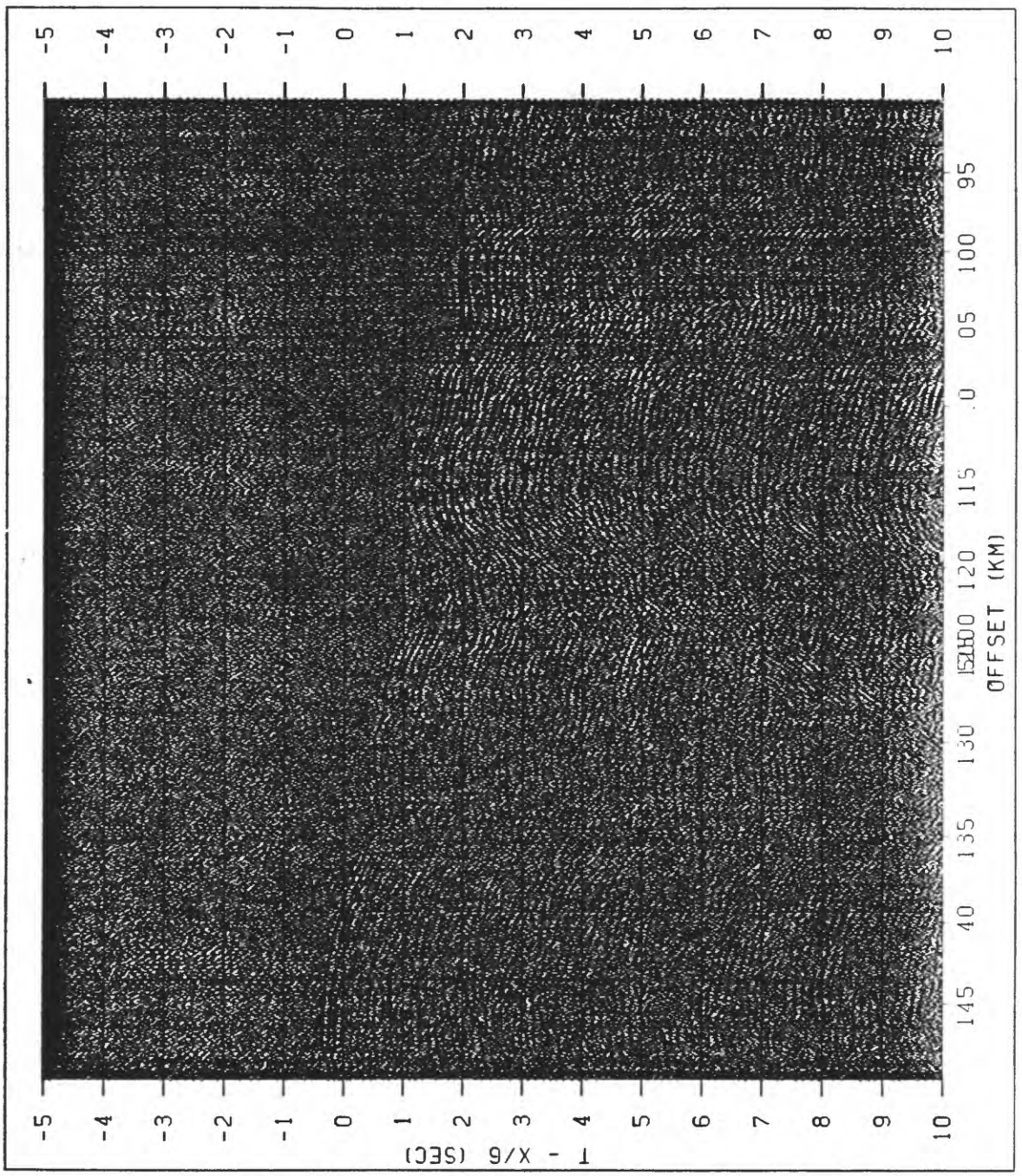


FIG. A-037. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 037
LINE 01B - GATHER 37 / STATION 0141

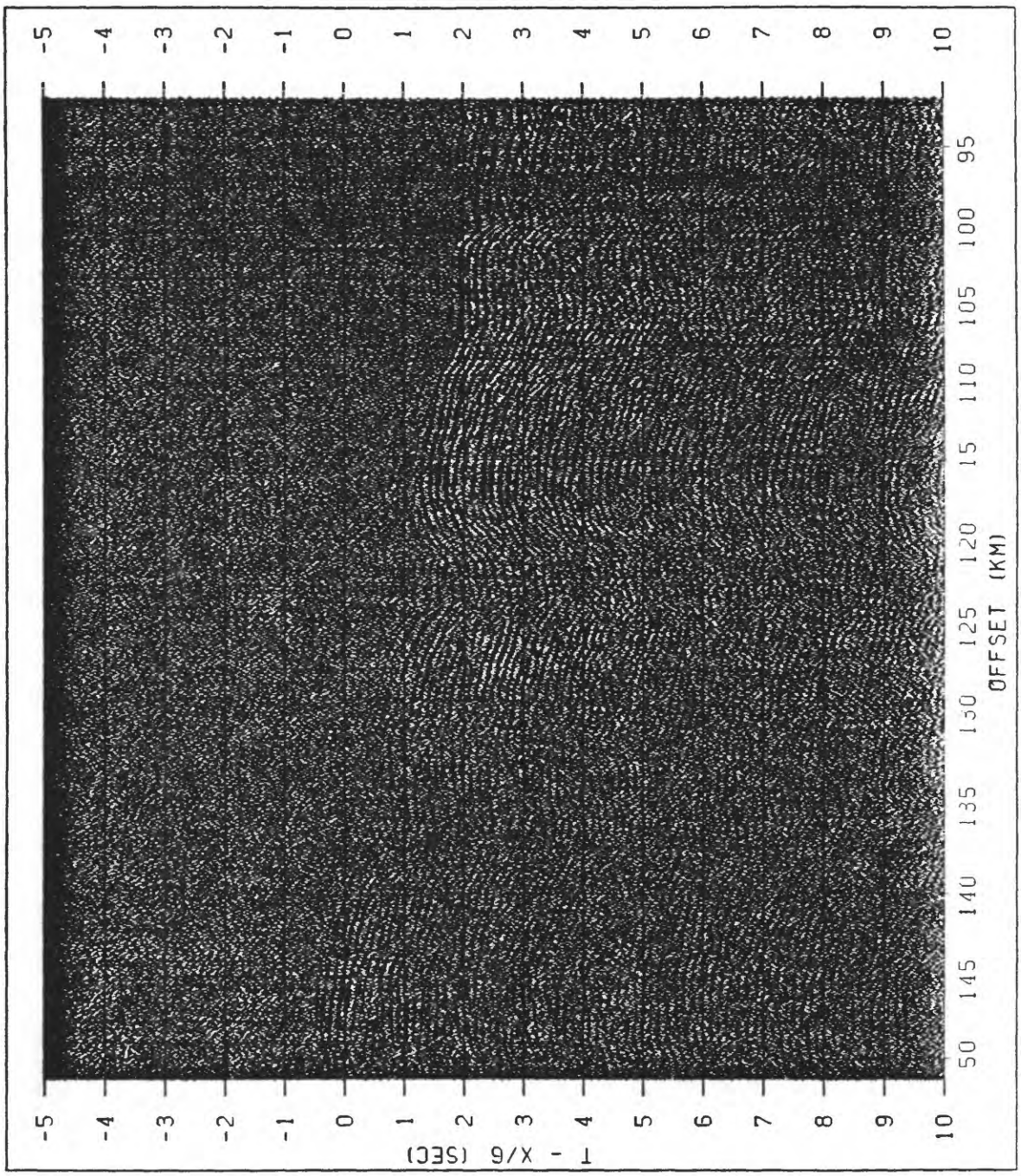


FIG. A-038. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 038
LINE 01B - GATHER 38 / STATION 0156

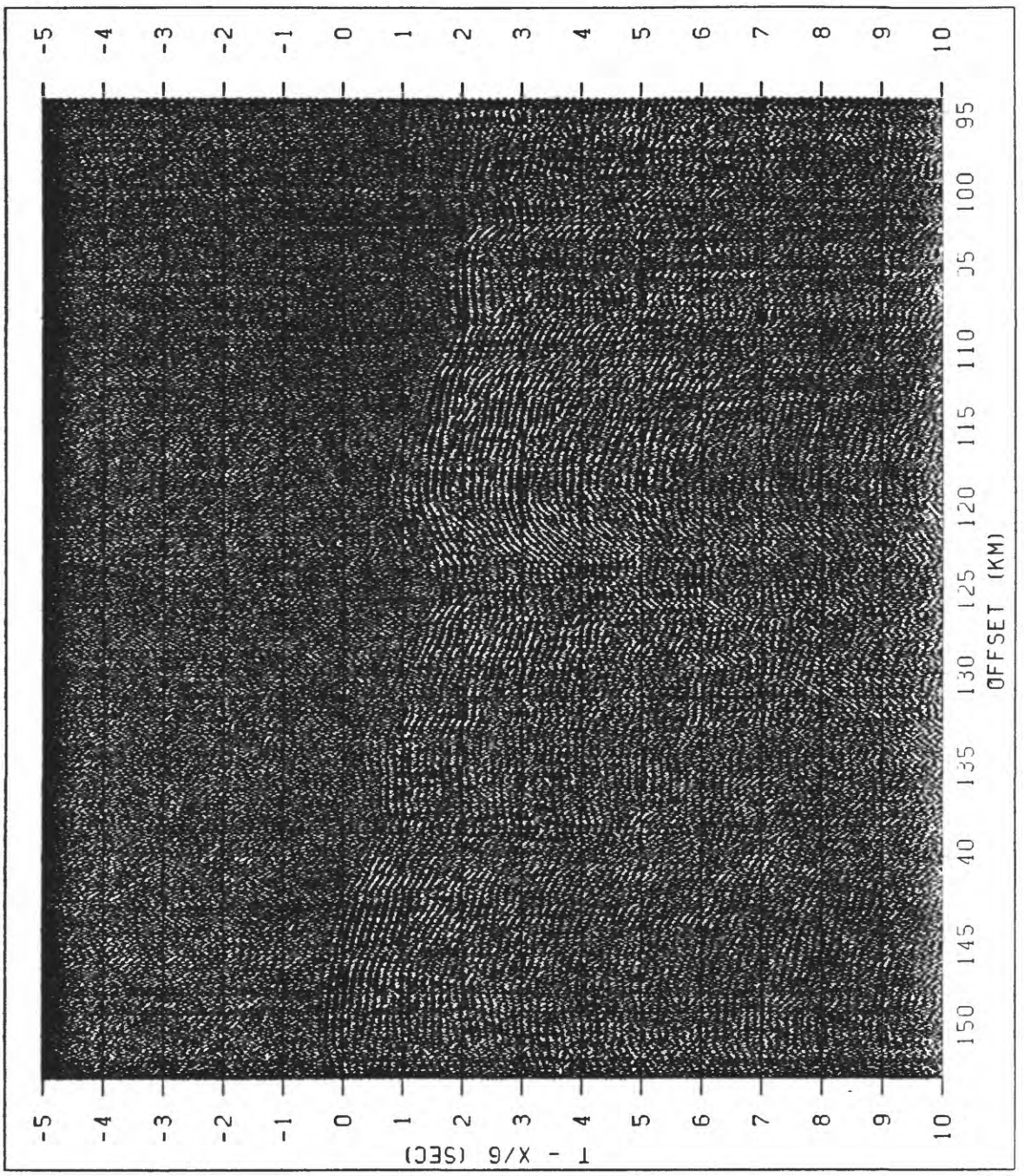


FIG. A-039. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 039
LINE 01B - GATHER 39 / STATION 0177

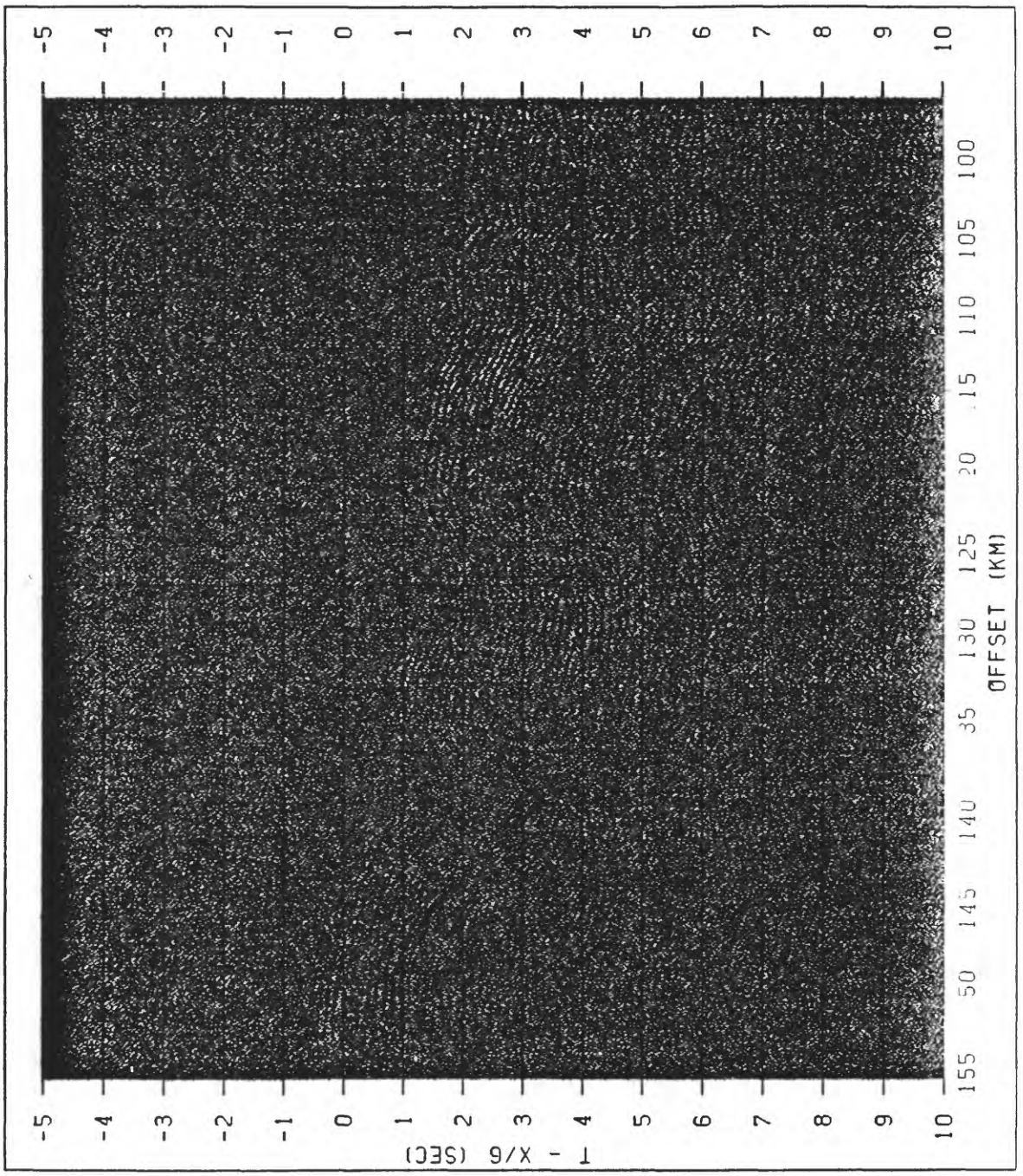


FIG. A-040. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 040
LINE 01B - GATHER 40 / STATION 0198

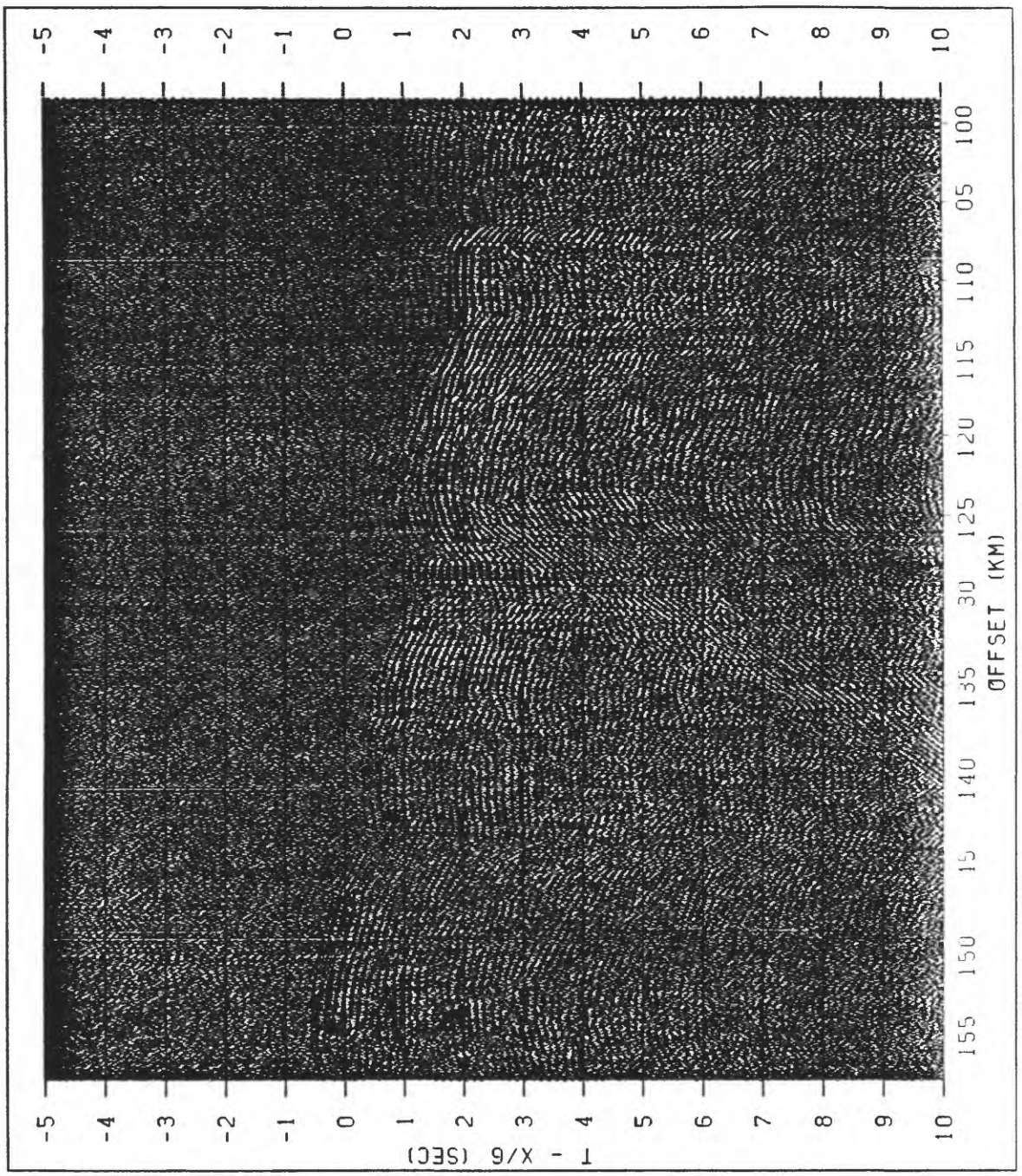


FIG. A-041. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 041
LINE 01B - GATHER 41 / STATION 0219

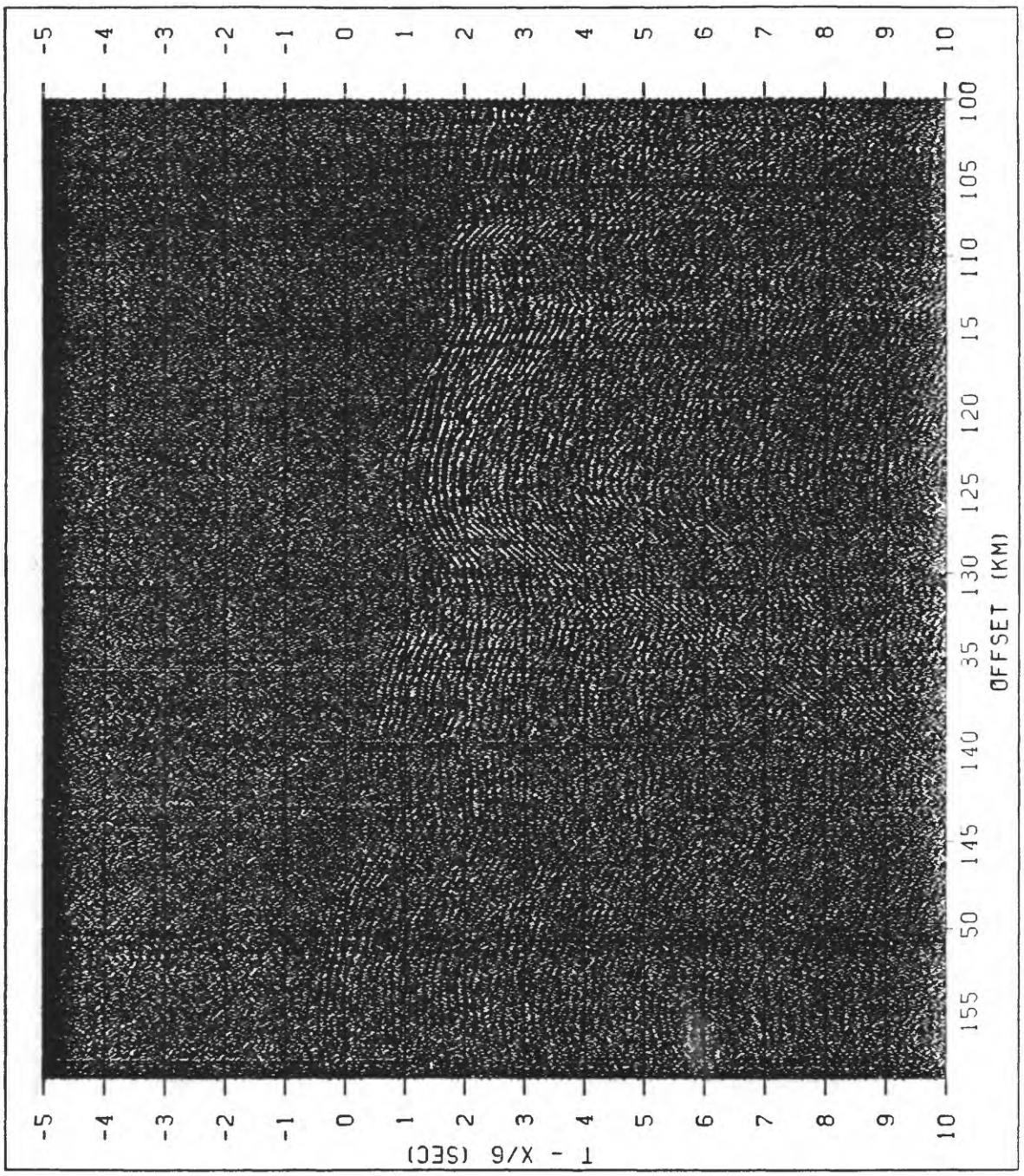


FIG. A-042. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 042
LINE 01B - GATHER 42 / STATION 0235

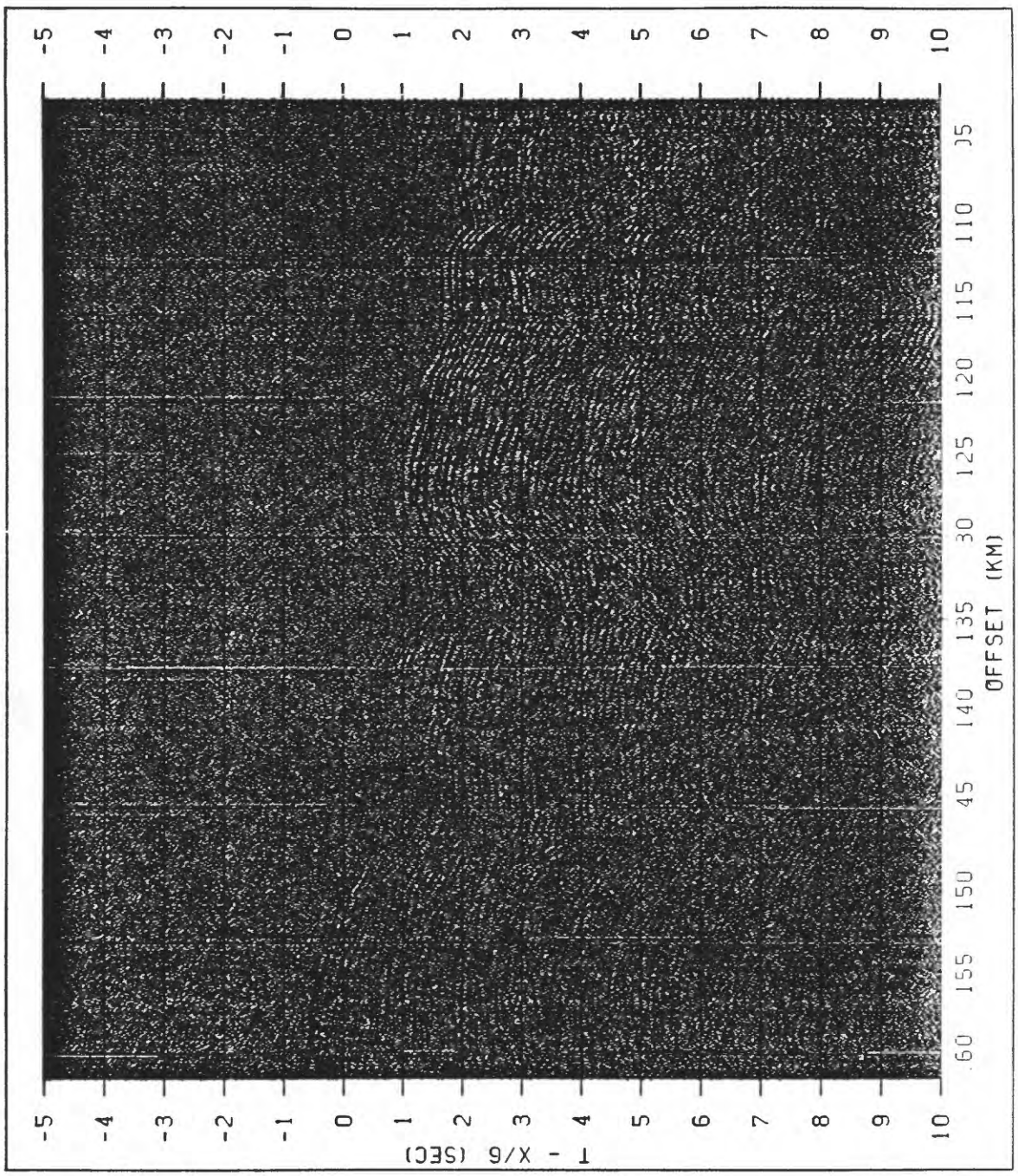


FIG. A-043. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 043
LINE 01B - GATHER 43 / STATION 0259

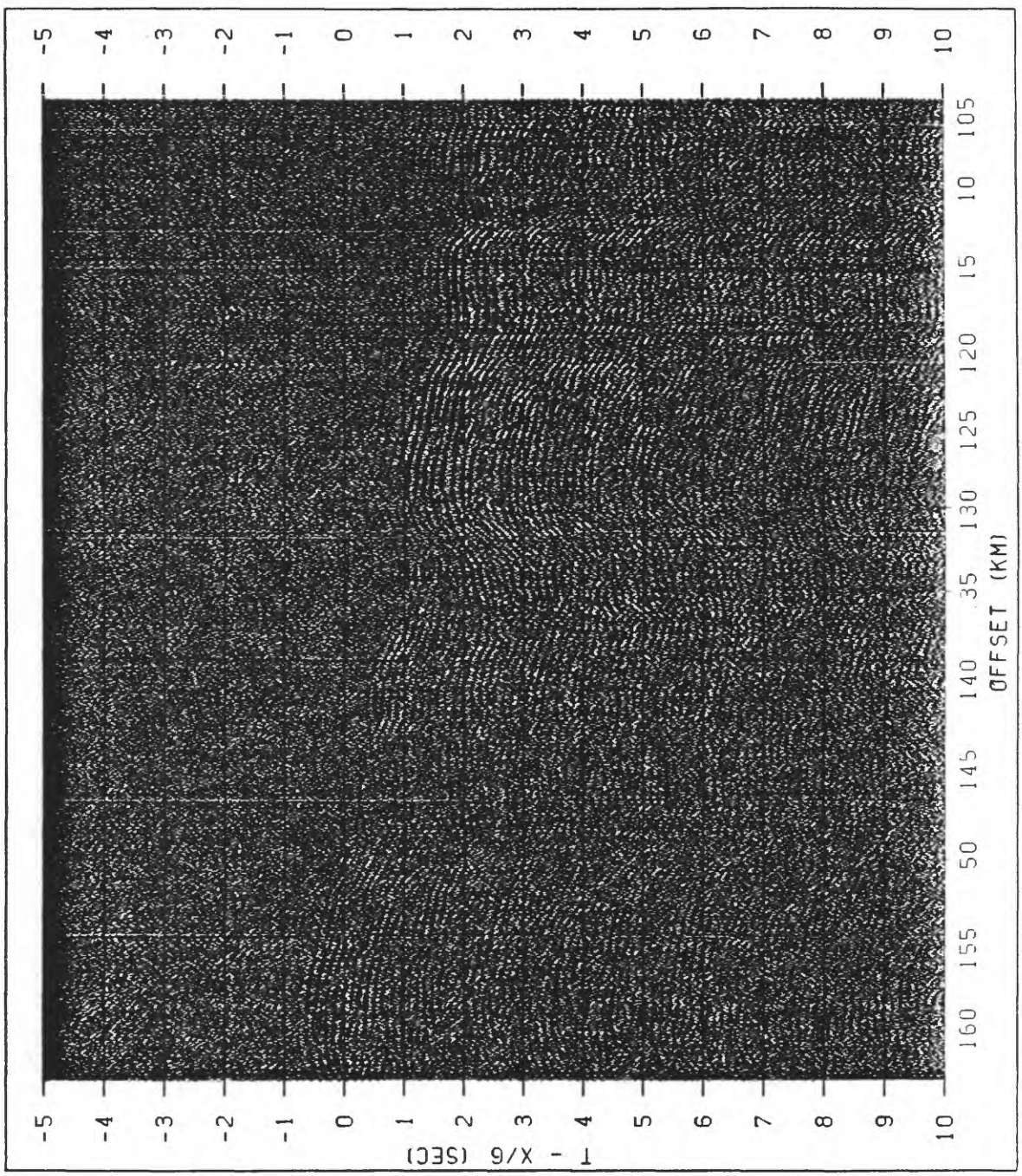


FIG. A-044. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 044
LINE 01B - GATHER 44 / STATION 0277

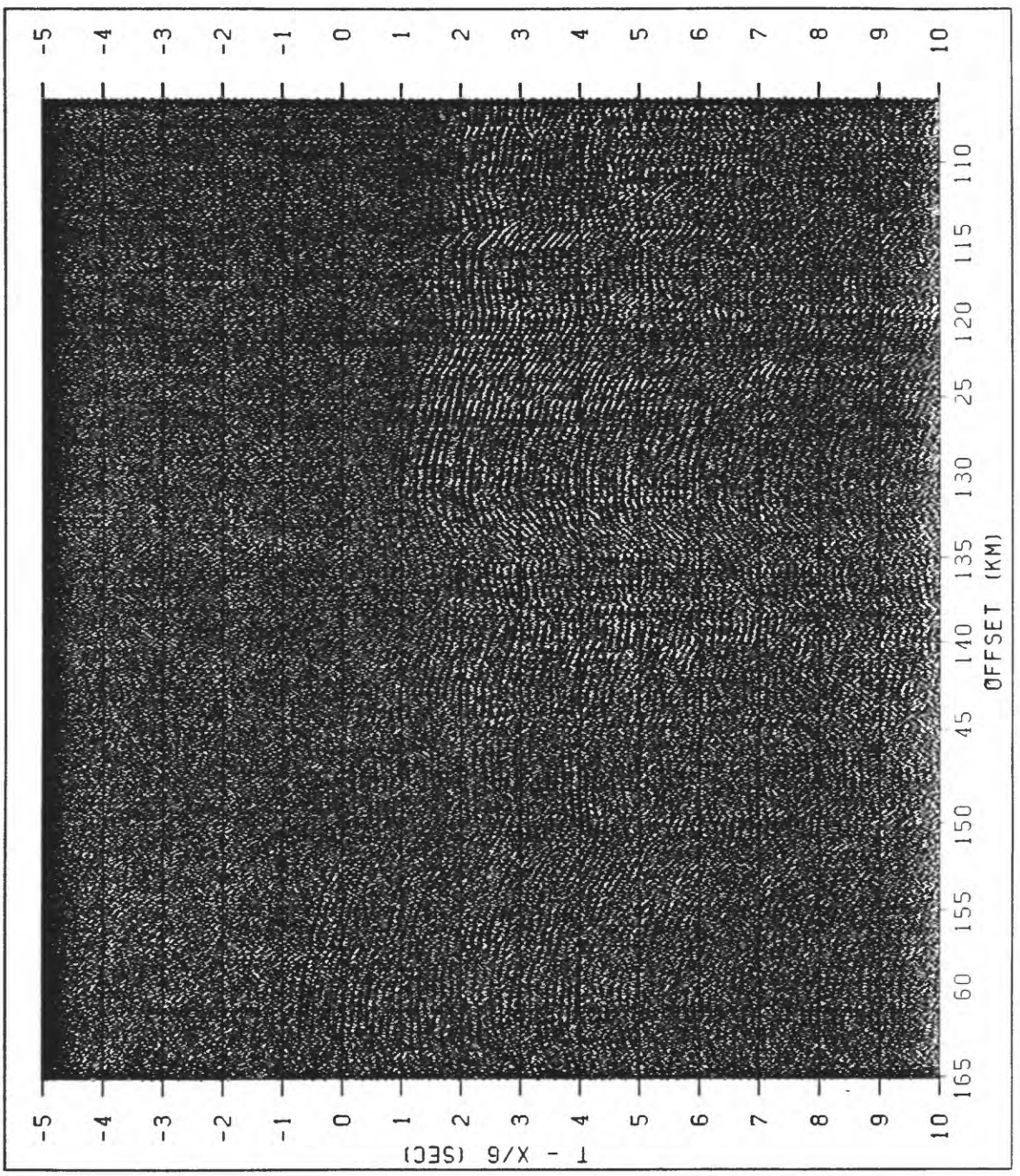


FIG. A-045. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 045
LINE 01B - GATHER 45 / STATION 0297

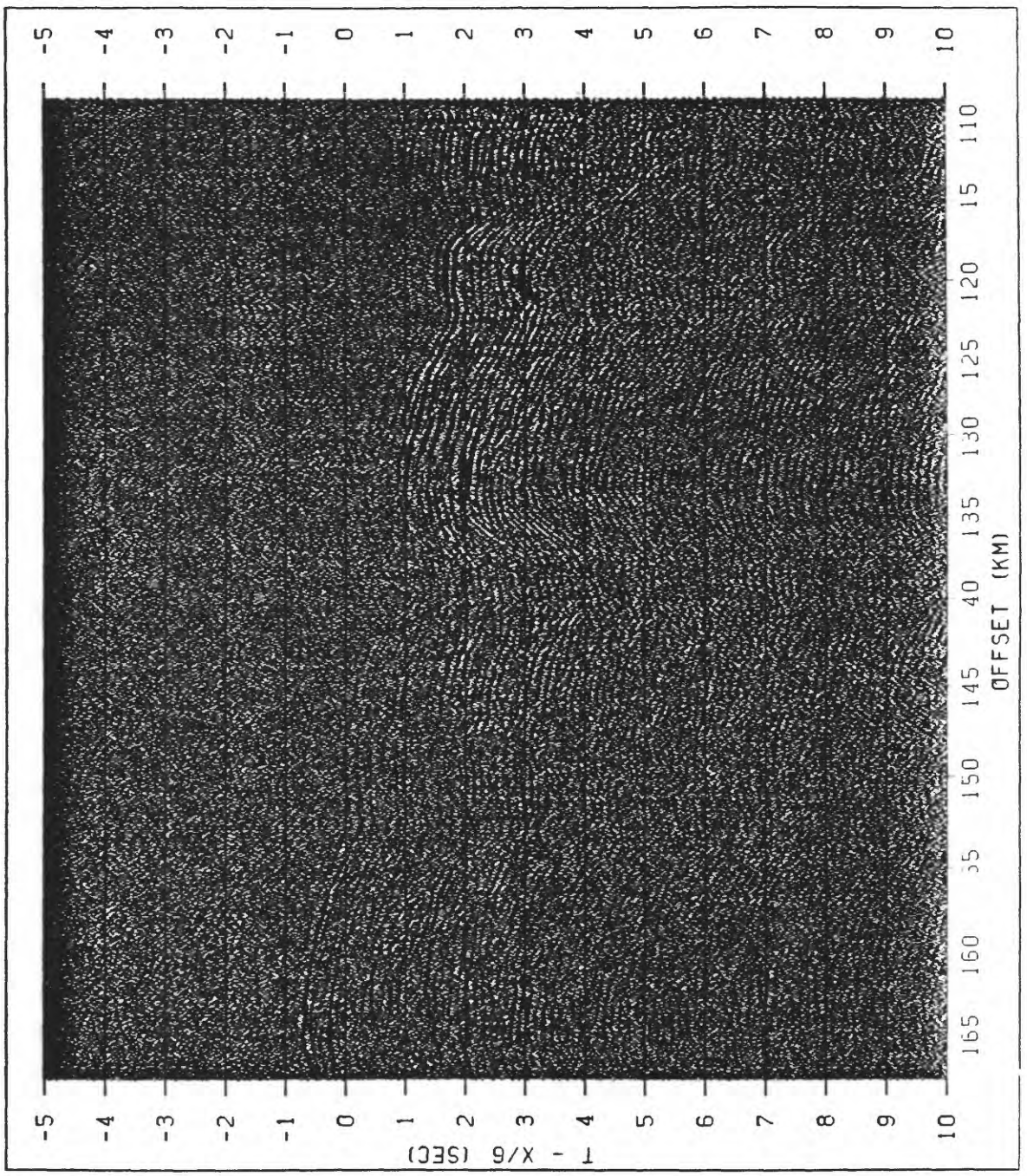


FIG. A-046. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 046
LINE 01B - GATHER 46 / STATION 0323

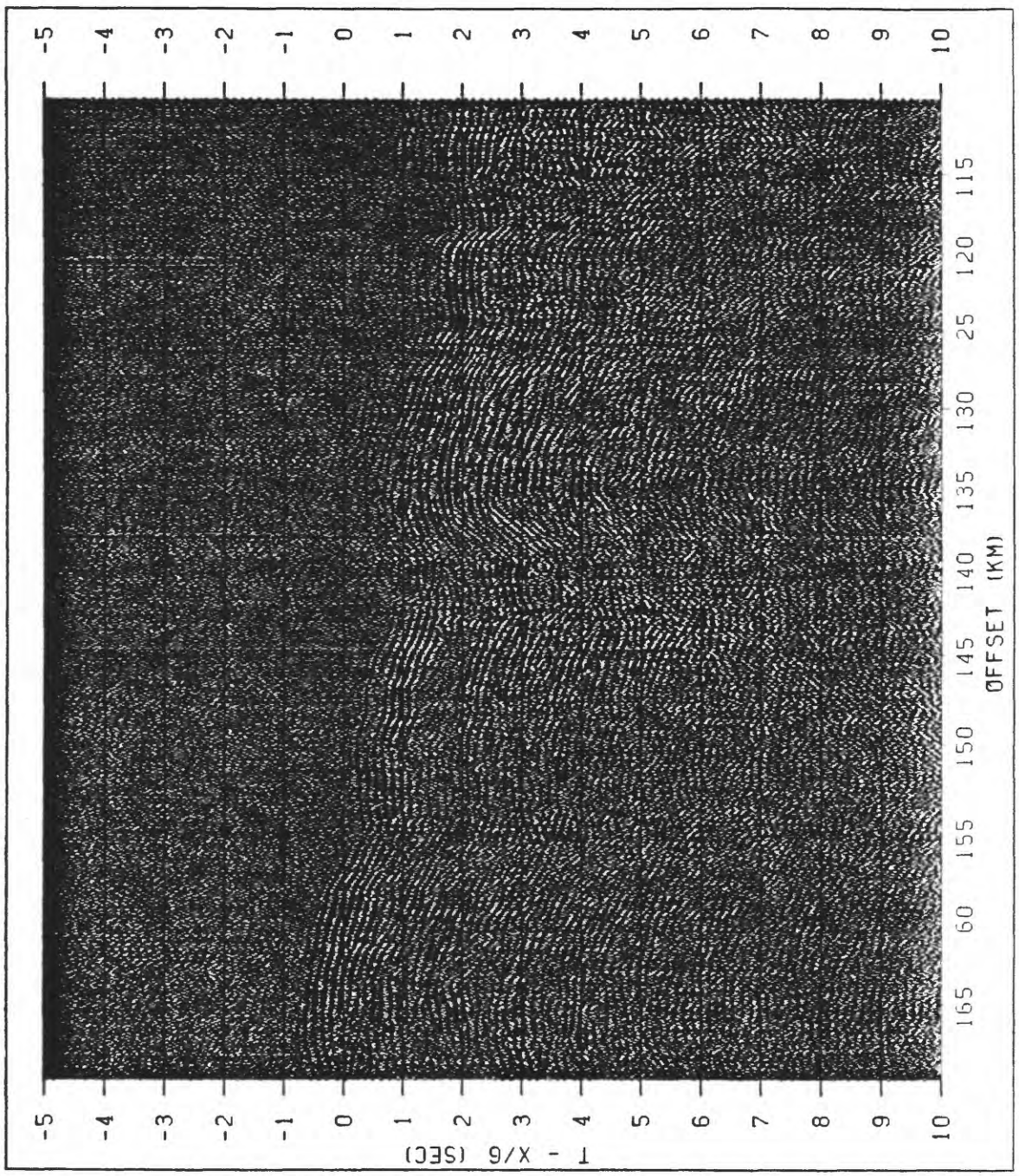


FIG. A-047. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 047
LINE 01B - GATHER 47 / STATION 0342

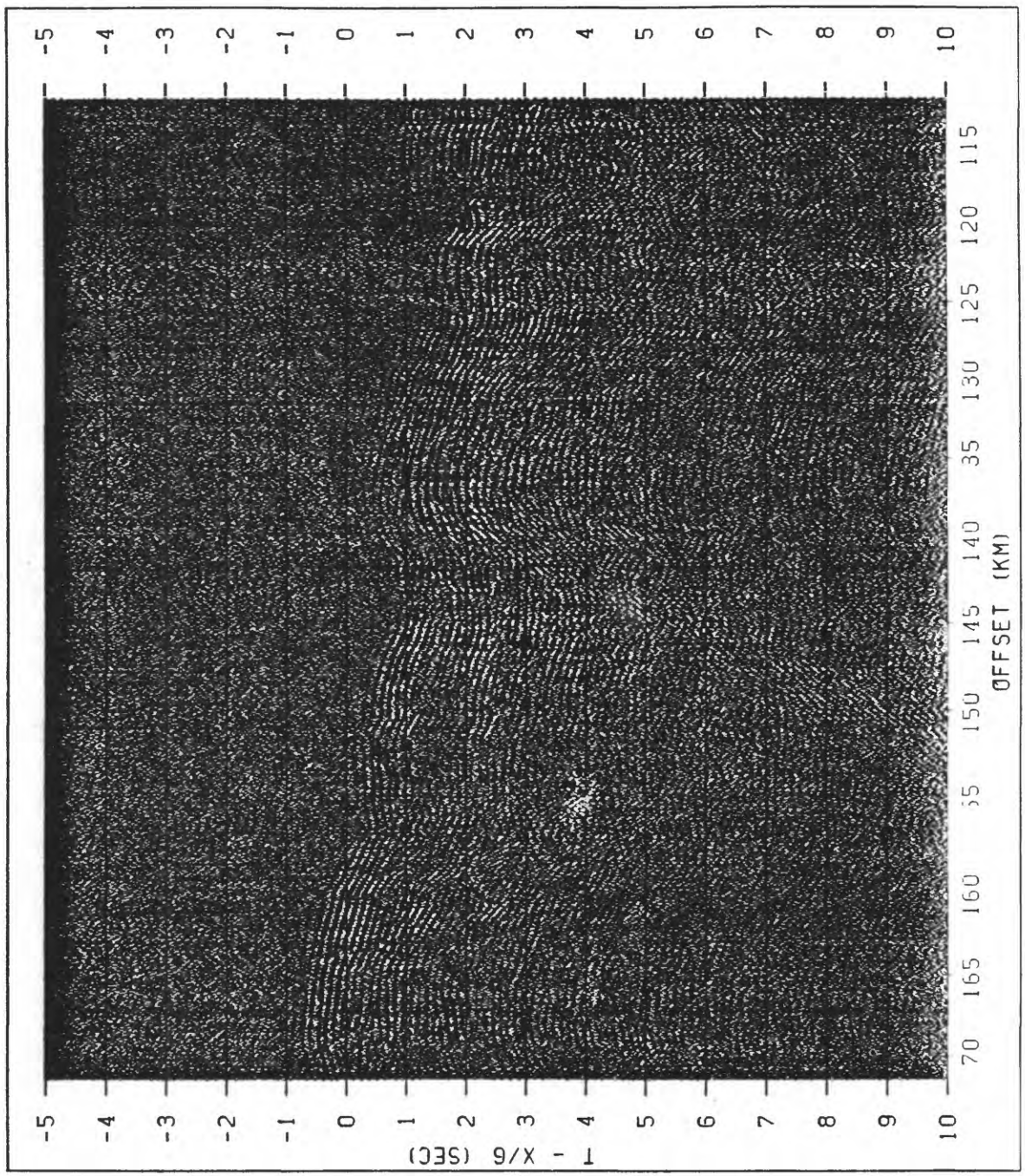


FIG. A-048. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 048
LINE 01B - GATHER 48 / STATION 0360

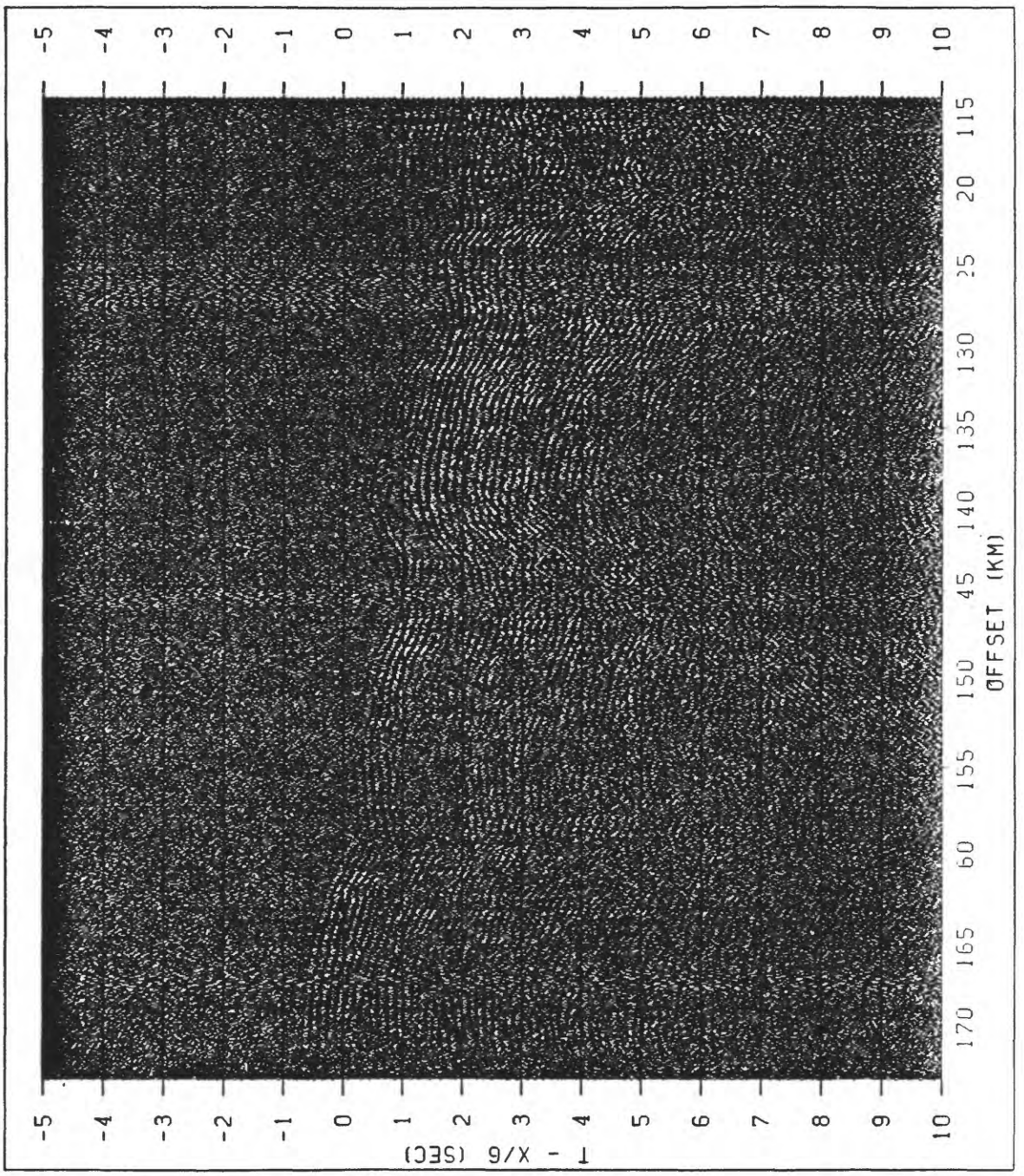


FIG. A-049. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 049
LINE 01B - GATHER 49 / STATION 0378

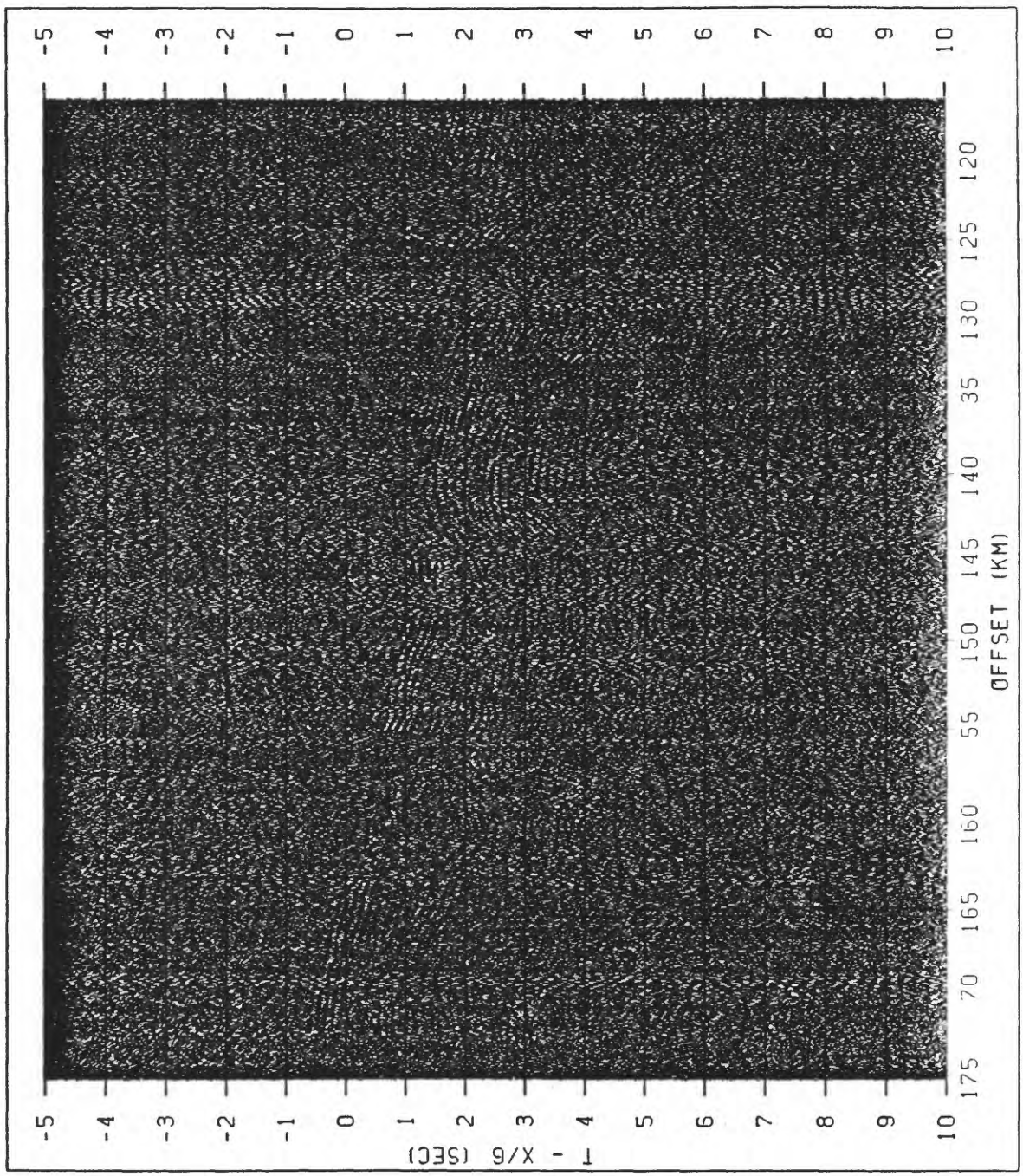


FIG. A-050. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 050
LINE 01B - GATHER 50 / STATION 0401

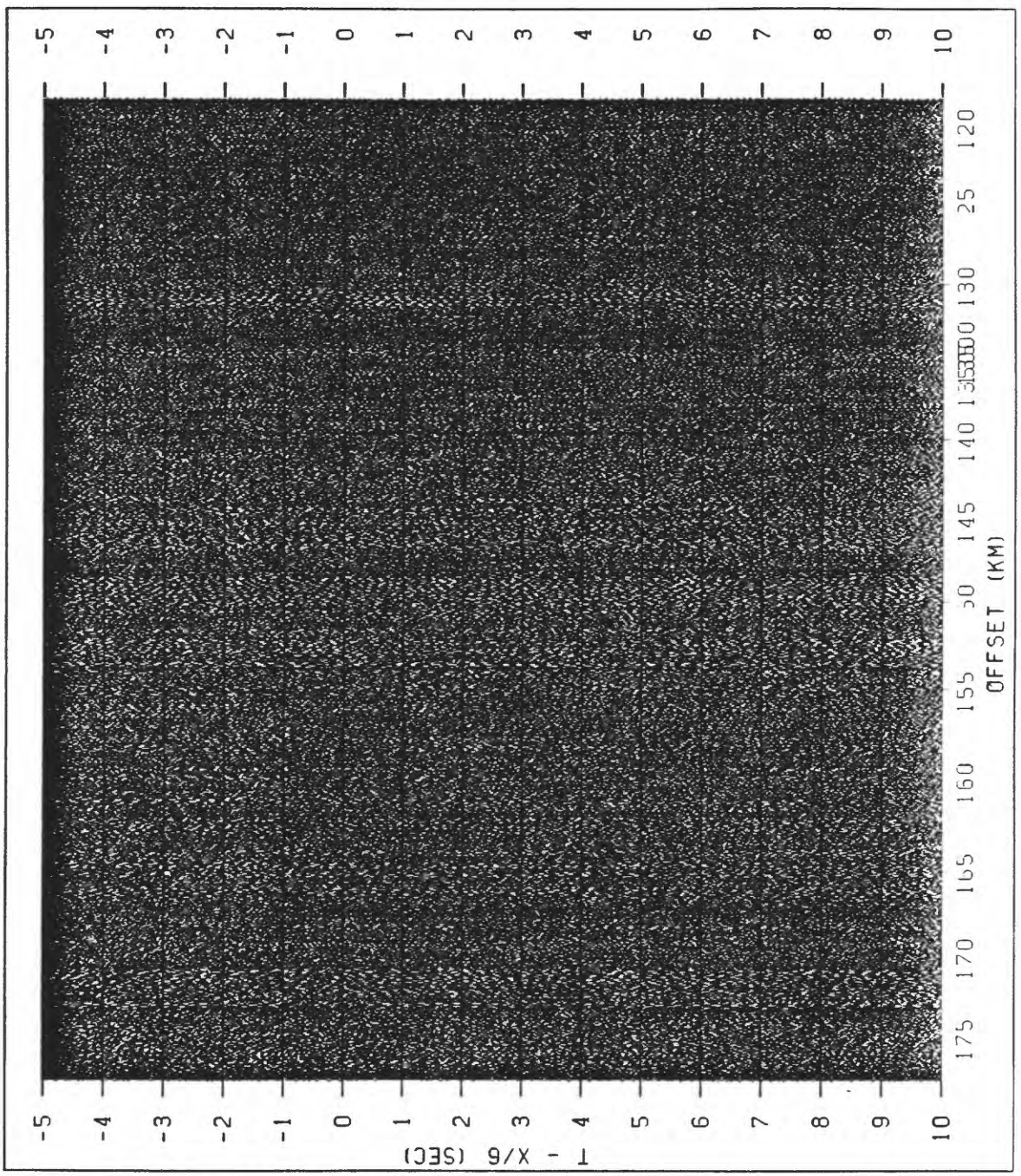


FIG. A-051. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 051
LINE 01B - GATHER 51 / STATION 0420

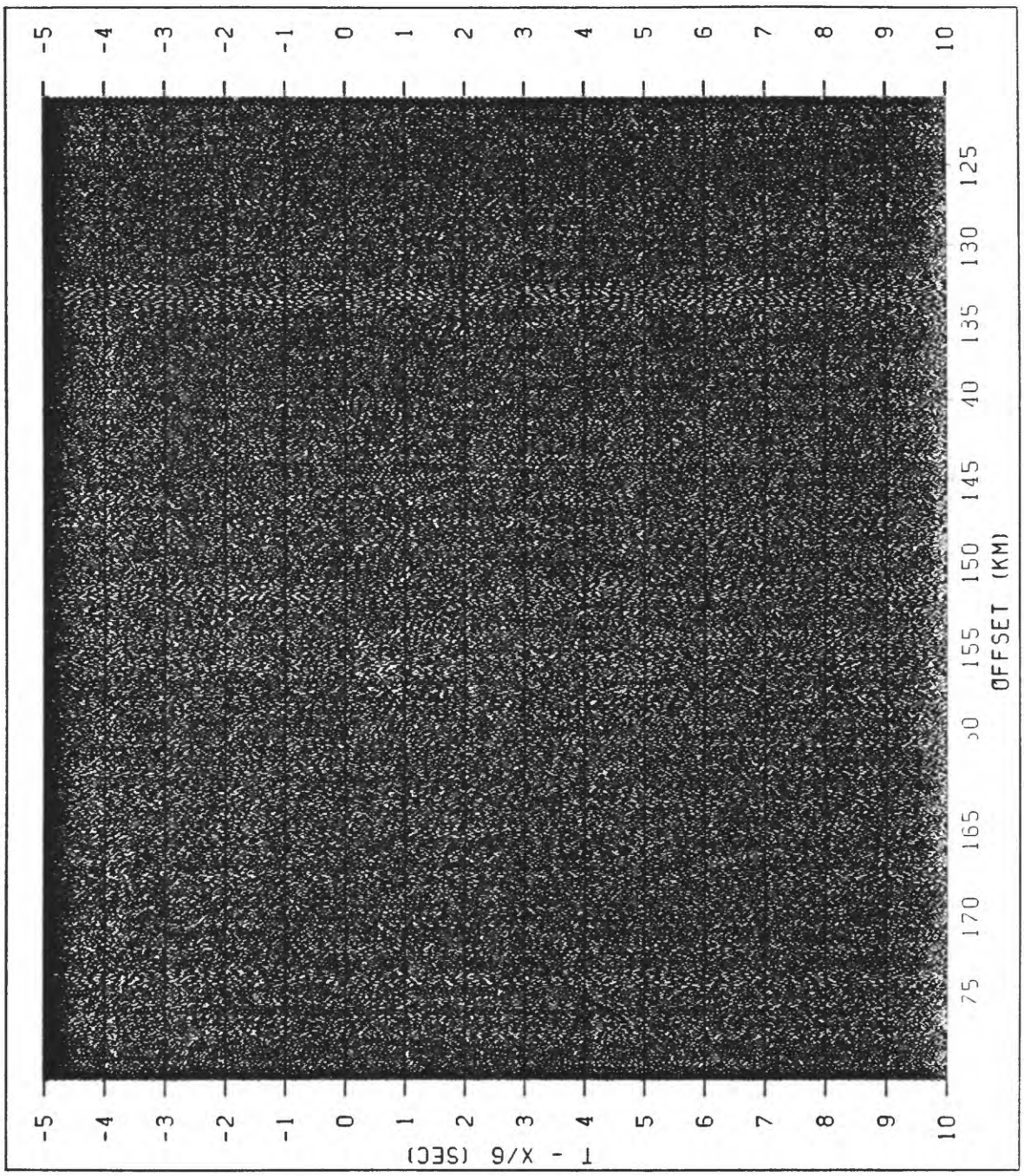


FIG. A-052. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 052
LINE 01B - GATHER 52 / STATION 0445

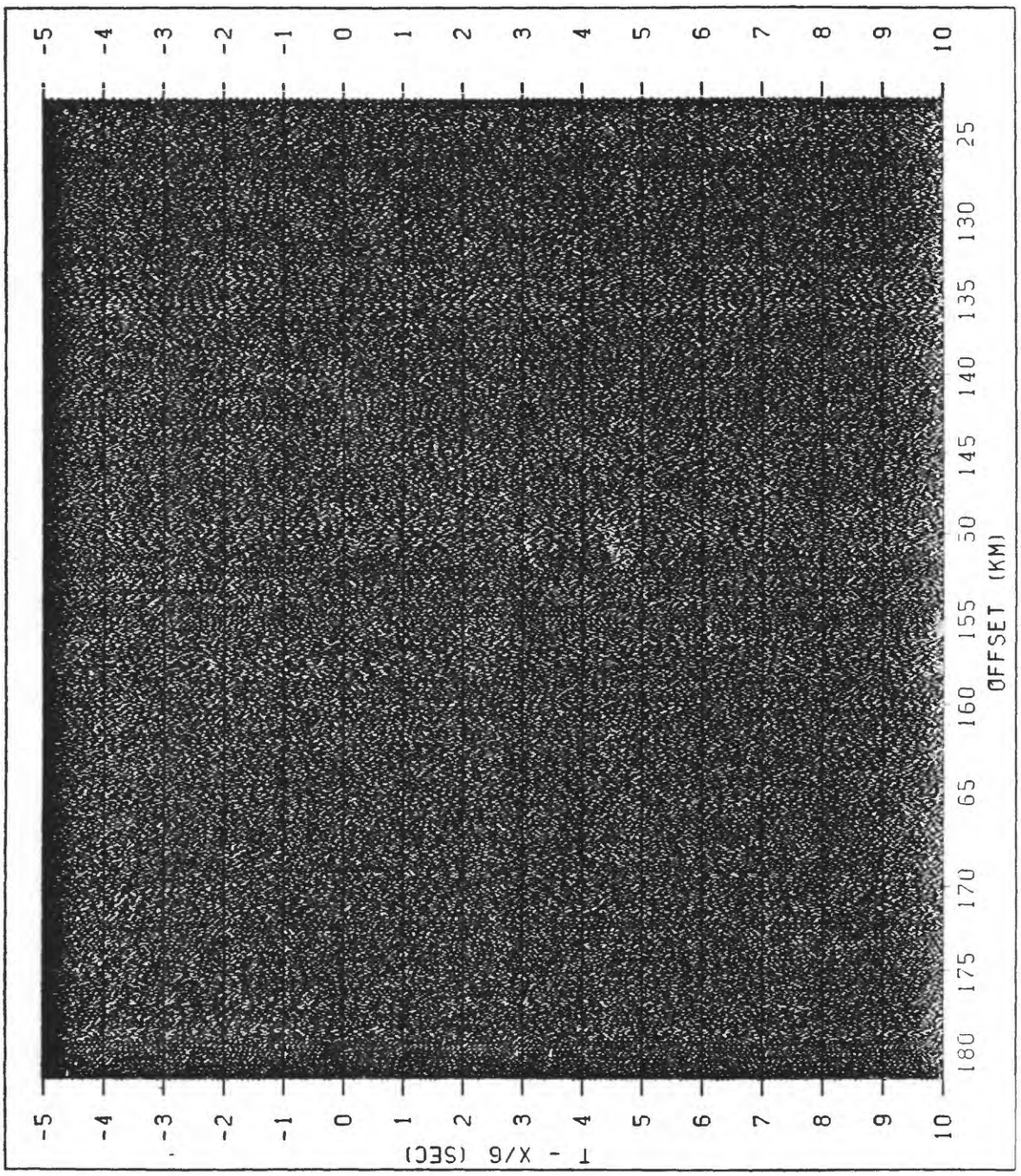


FIG. A-053. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 053
LINE 01B - GATHER 53 / STATION 0460

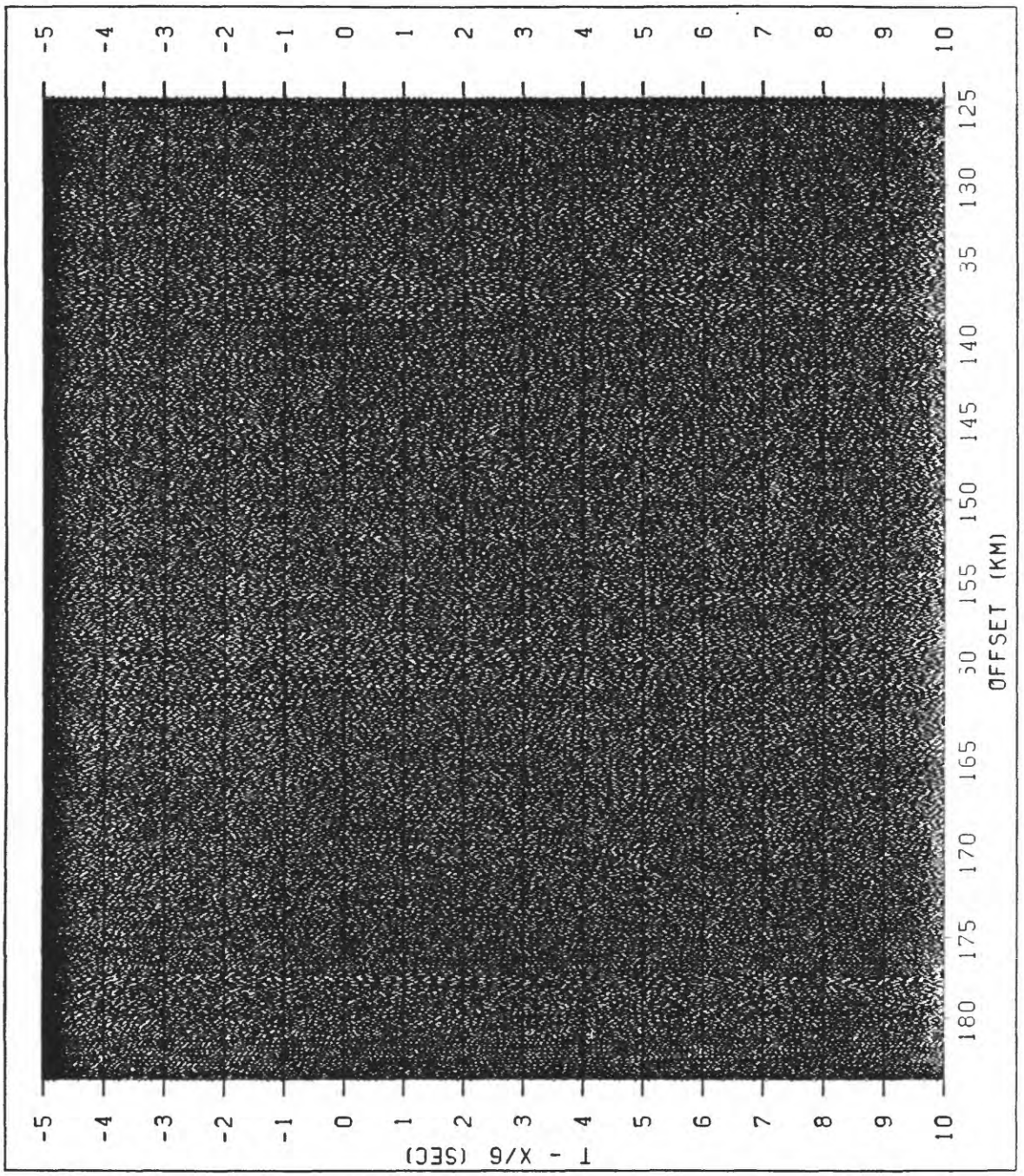


FIG. A-054. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 054
LINE 01B - GATHER 54 / STATION 0480

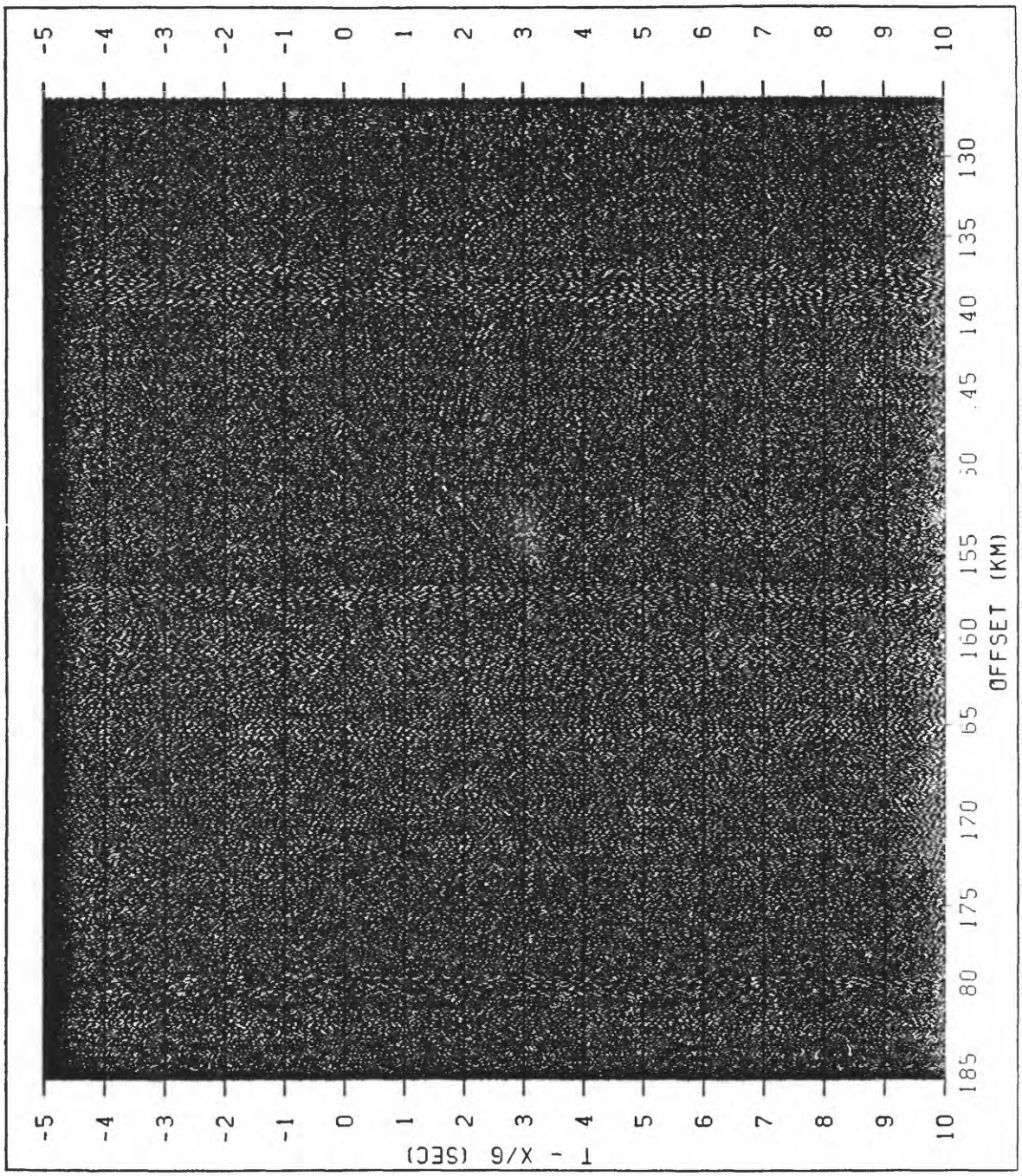


FIG. A-055. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 055
LINE 01B - GATHER 55 / STATION 0500

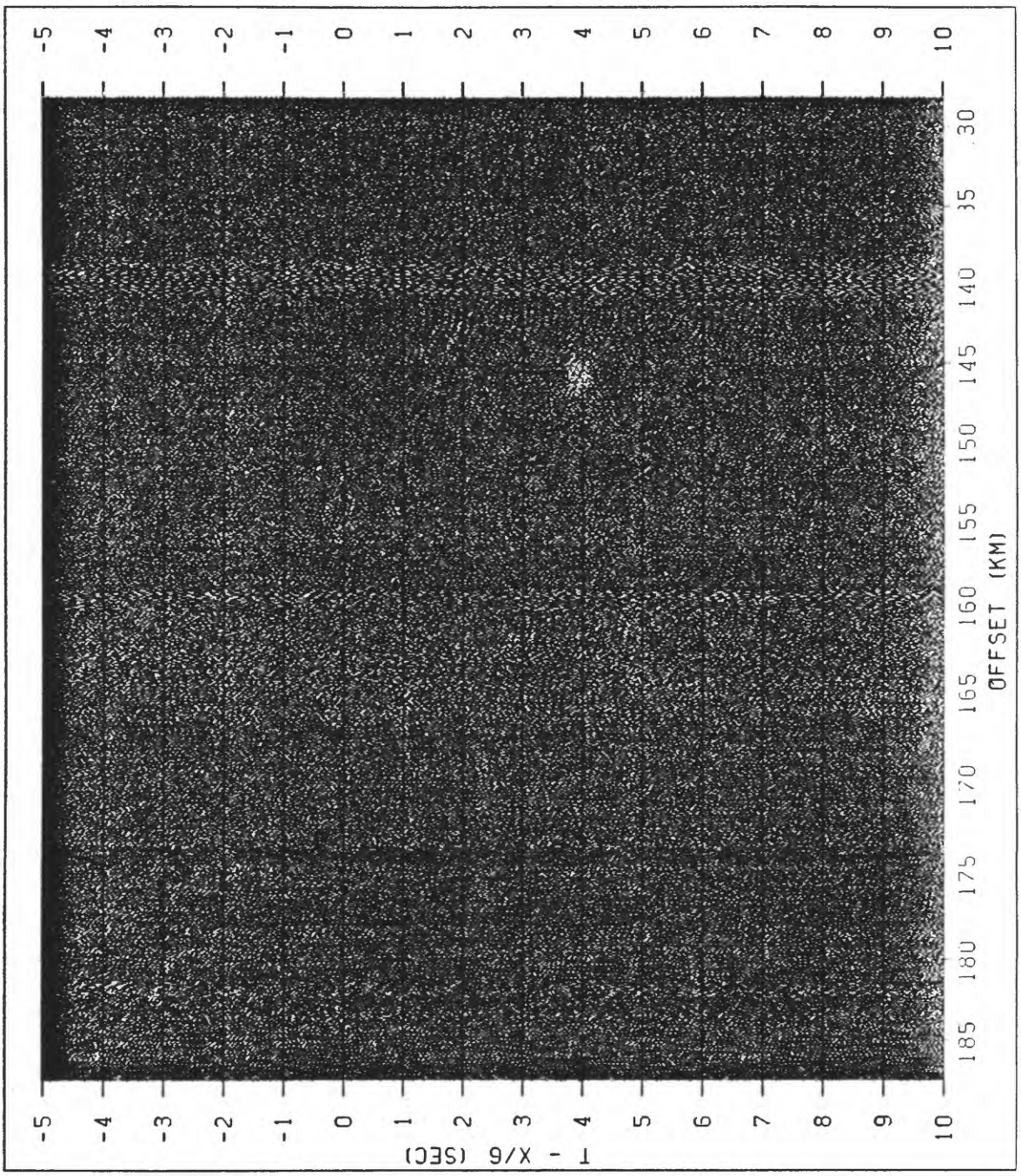


FIG. A-056. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 056
LINE 01B - GATHER 56 / STATION 0515

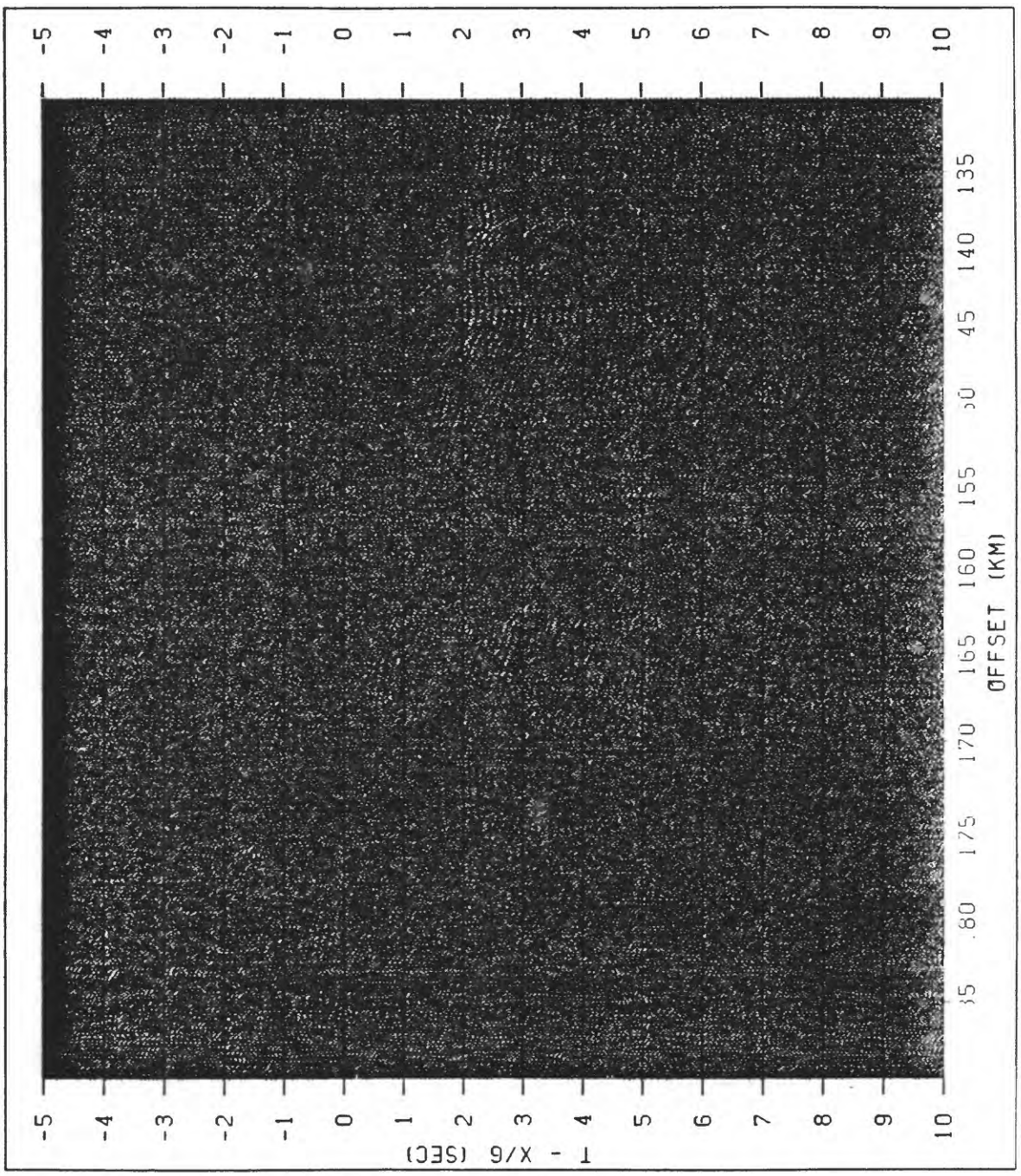


FIG. A-057. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 057
LINE 01B - GATHER 57 / STATION 0540

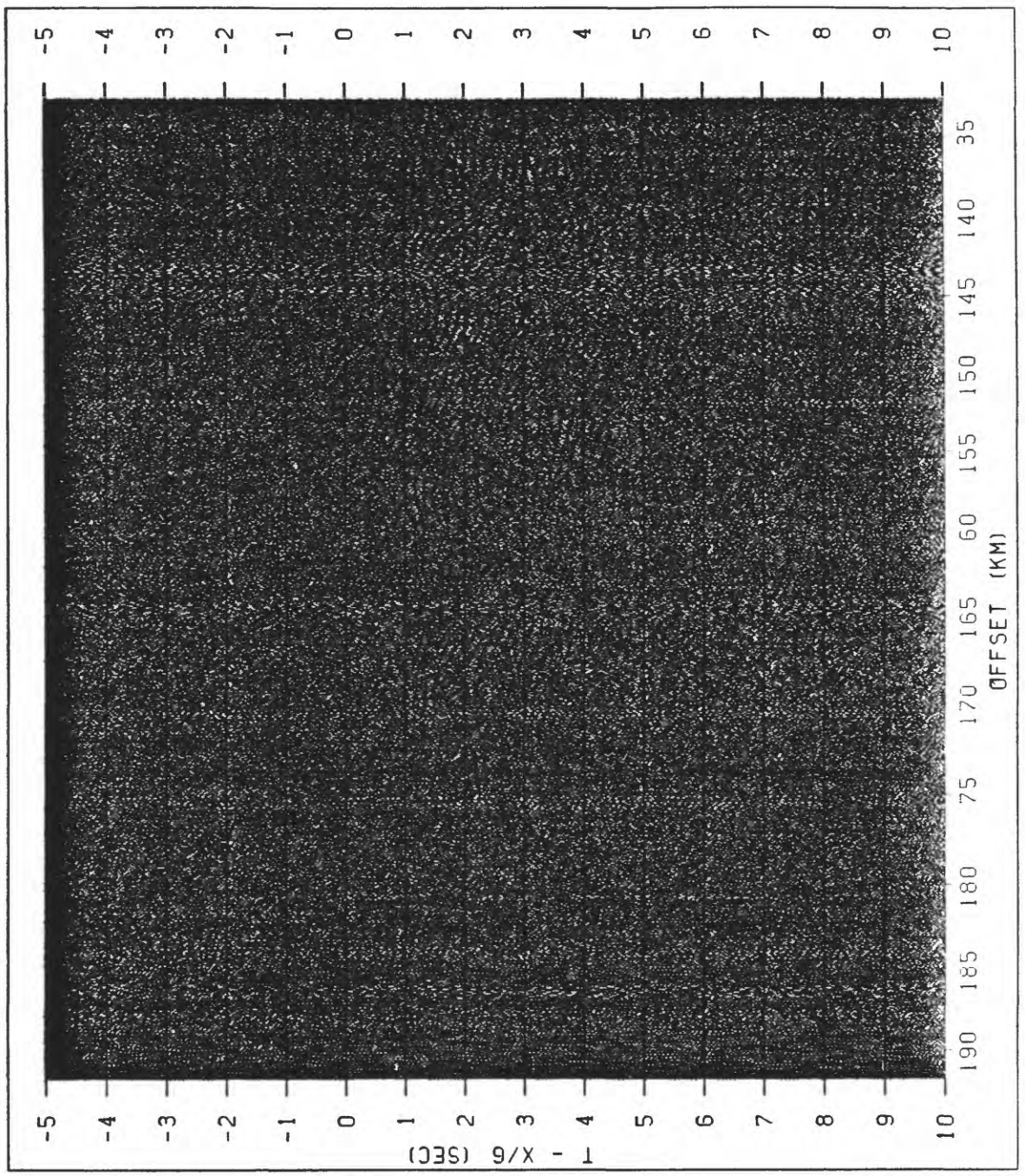


FIG. A-058. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 058
LINE 01B - GATHER 58 / STATION 0560

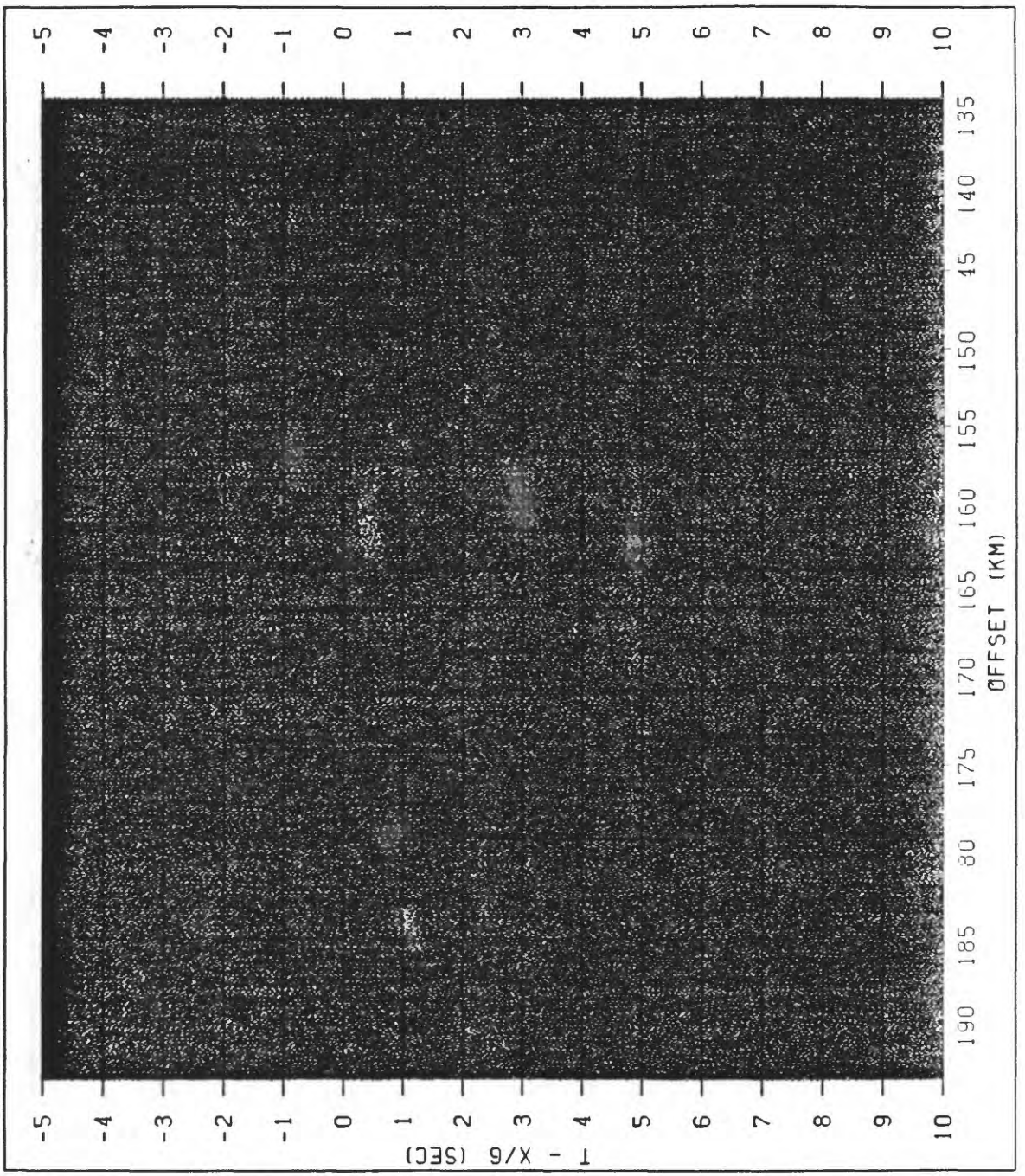


FIG. A-059. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 059
LINE 01B - GATHER 59 / STATION 0580

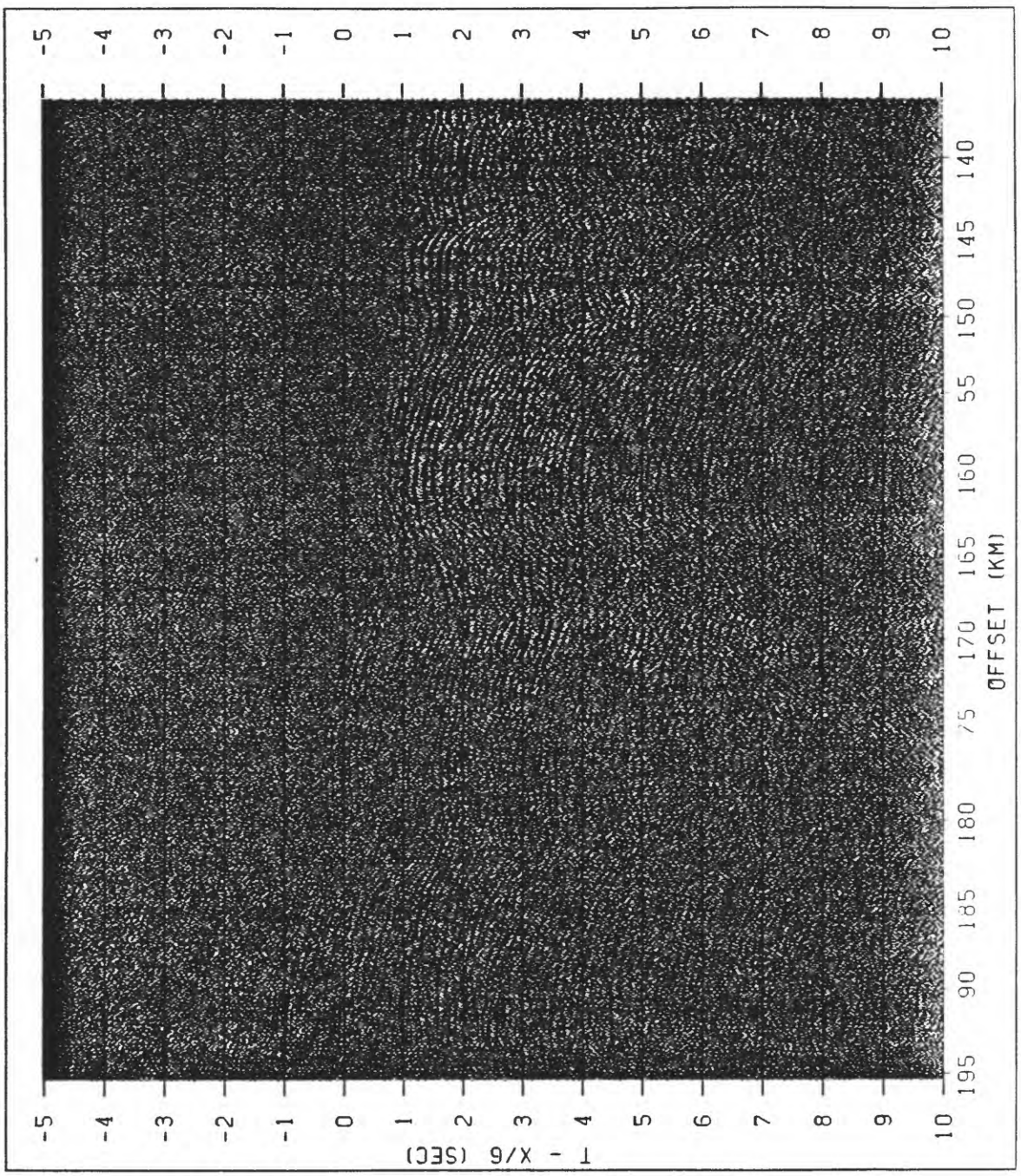


FIG. A-060. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 060
LINE 01B - GATHER 60 / STATION 0600

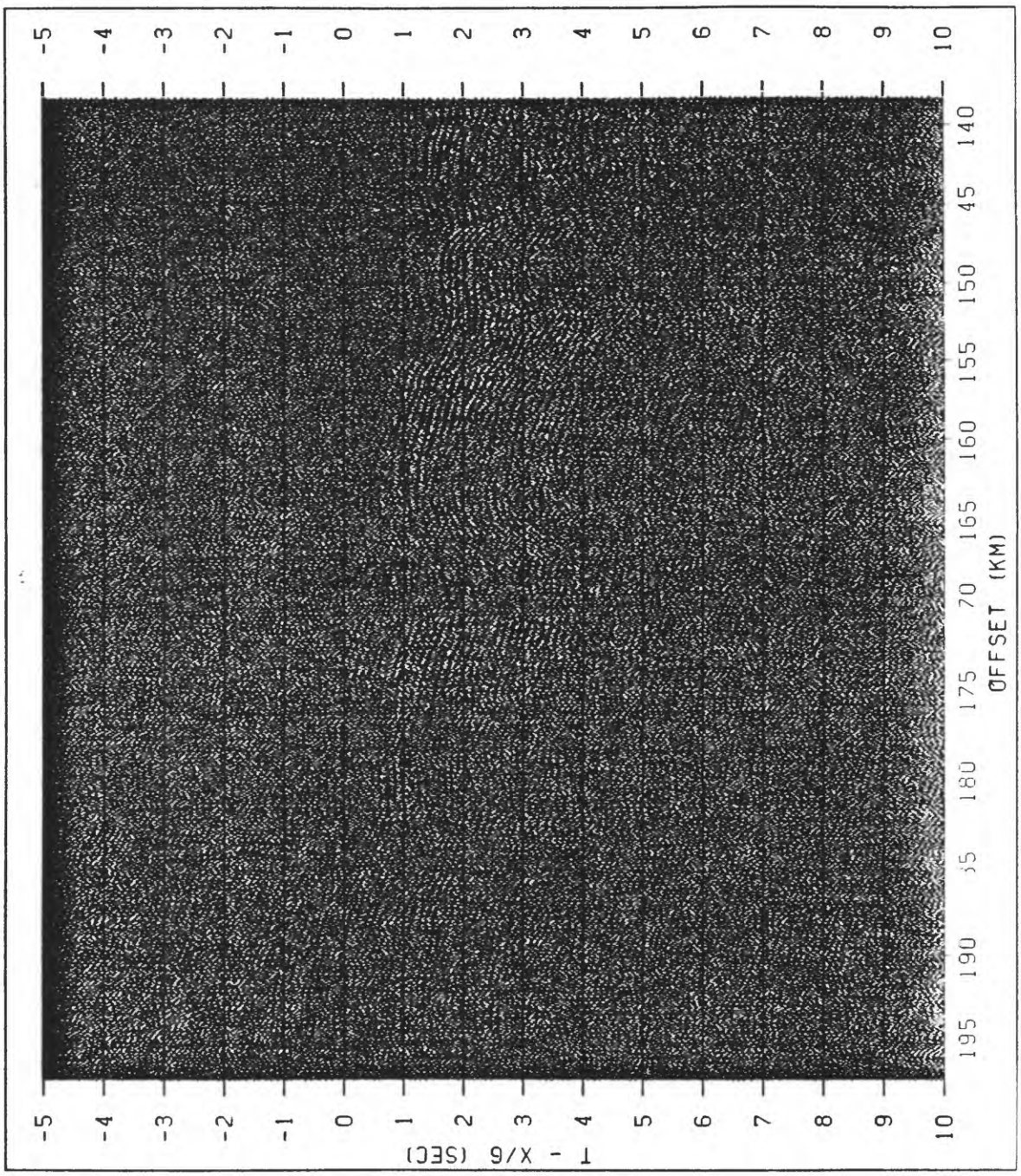


FIG. A-061. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 061
LINE 01B - GATHER 61 / STATION 0620

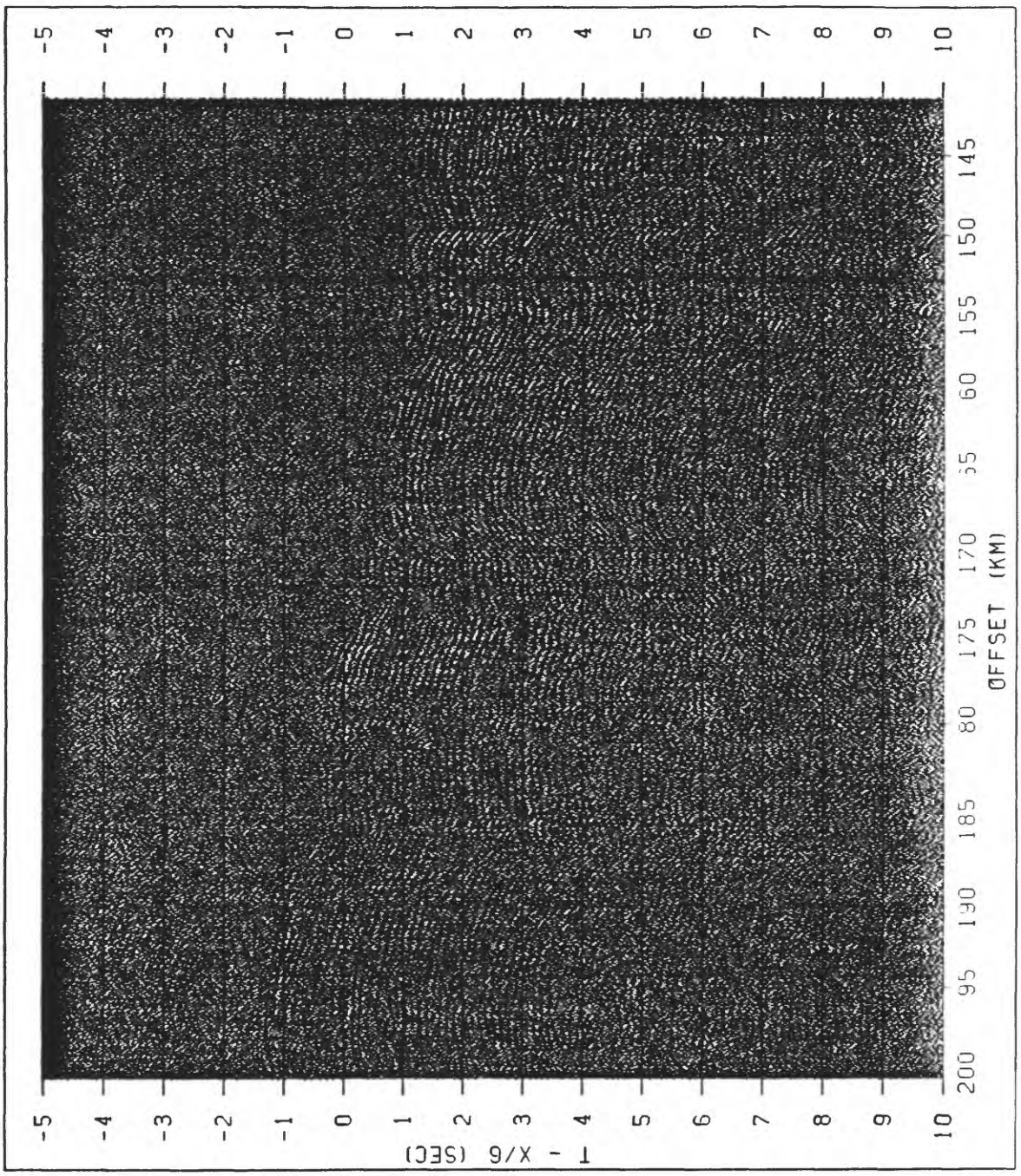


FIG. A-062. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 062
LINE 01B - GATHER 62 / STATION 0650

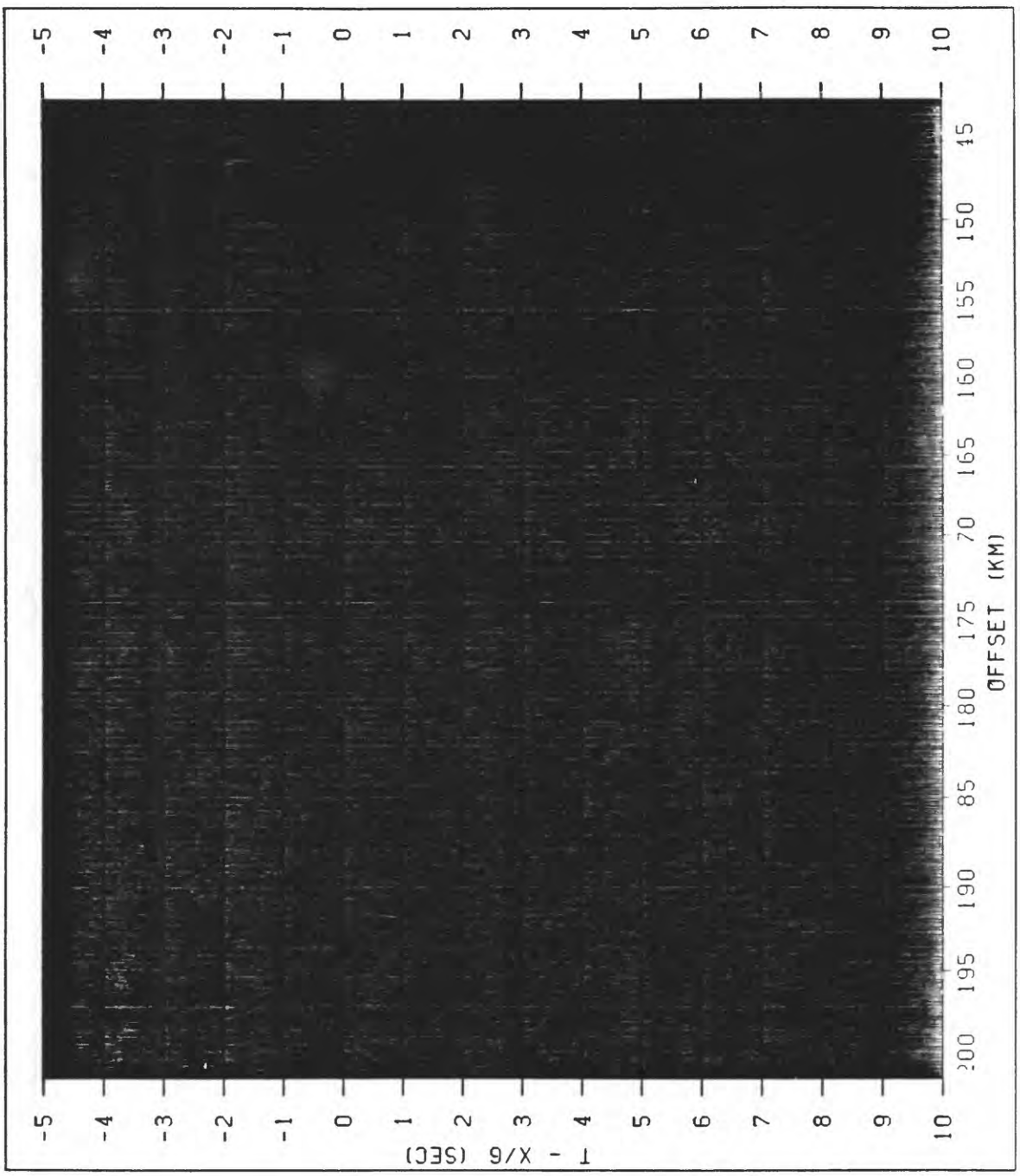


FIG. A-063. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 063
LINE 01B - GATHER 63 / STATION 0660

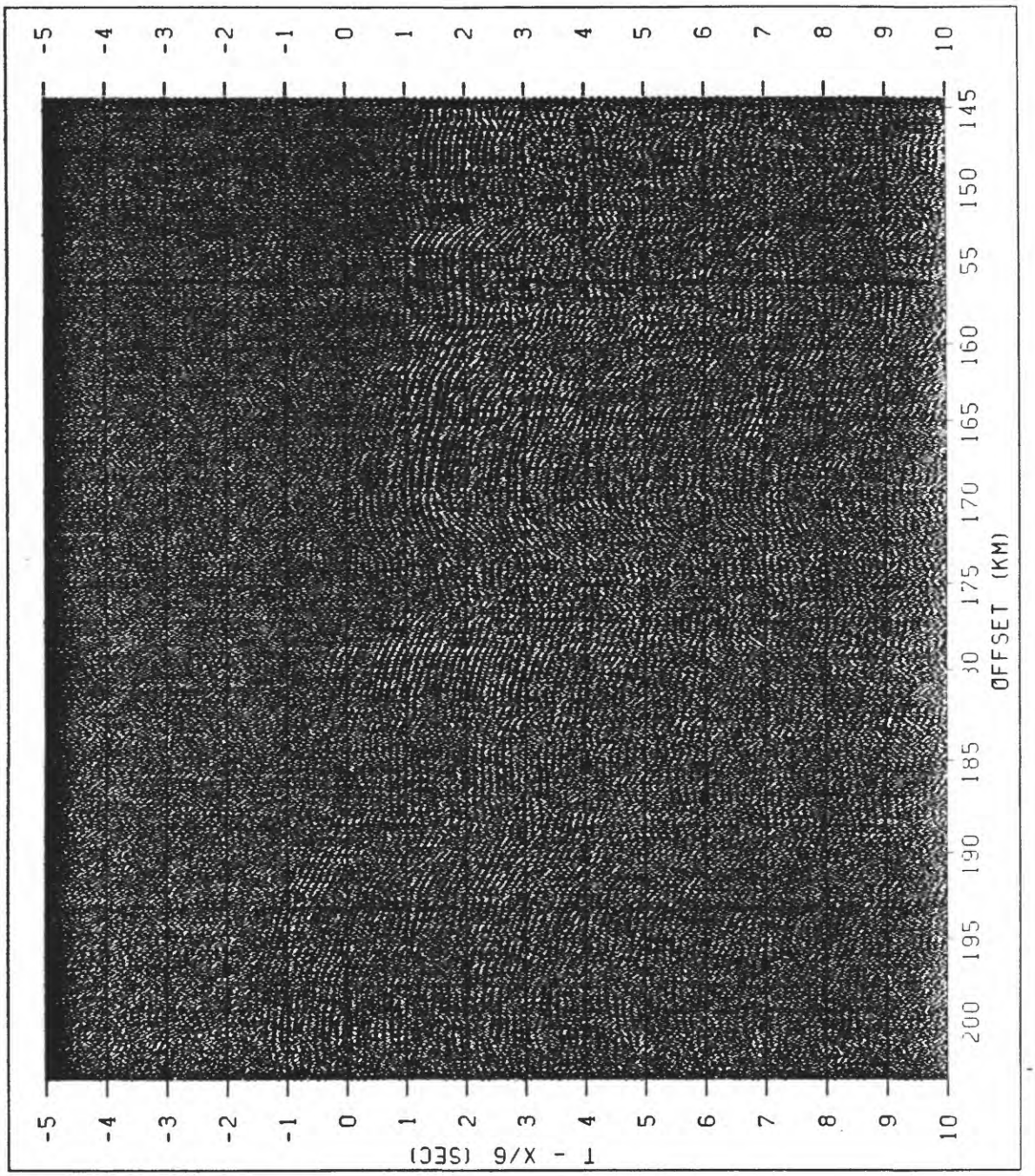


FIG. A-064. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 064
LINE 01B - GATHER 64 / STATION 0680

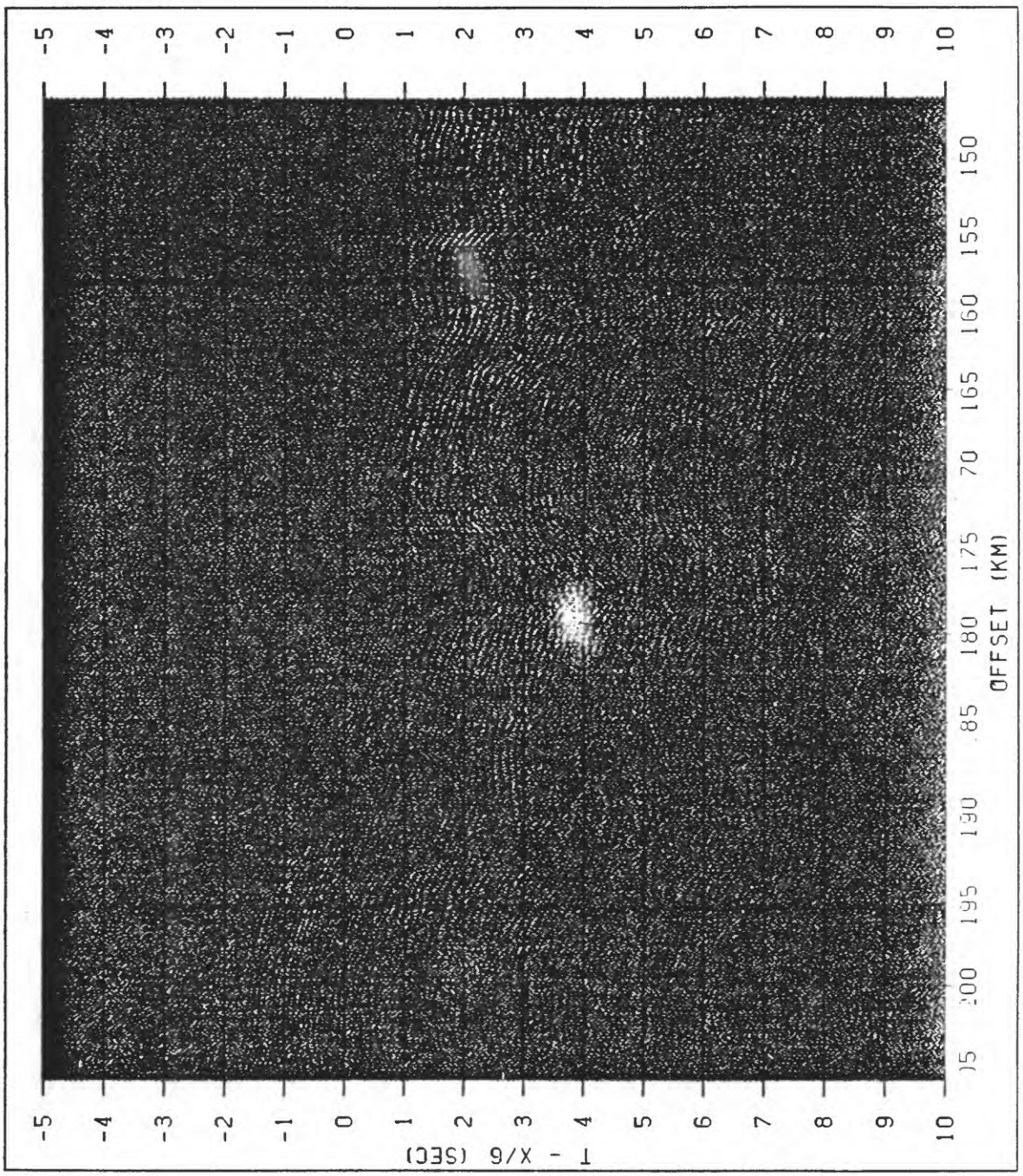


FIG. A-065. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 065
LINE 01B - GATHER 65 / STATION 0700

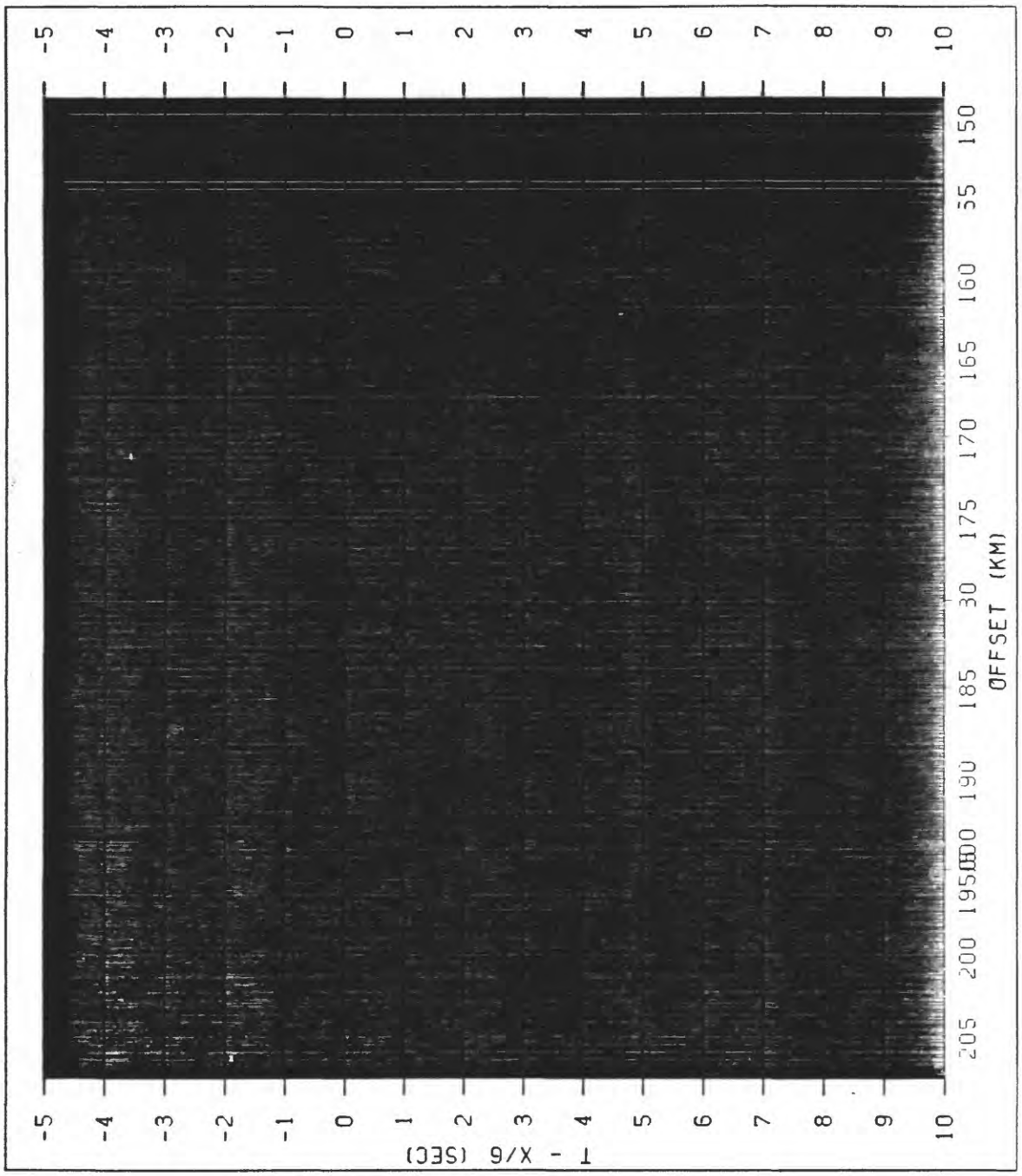


FIG. A-066. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 066
LINE 01B - GATHER 66 / STATION 0720

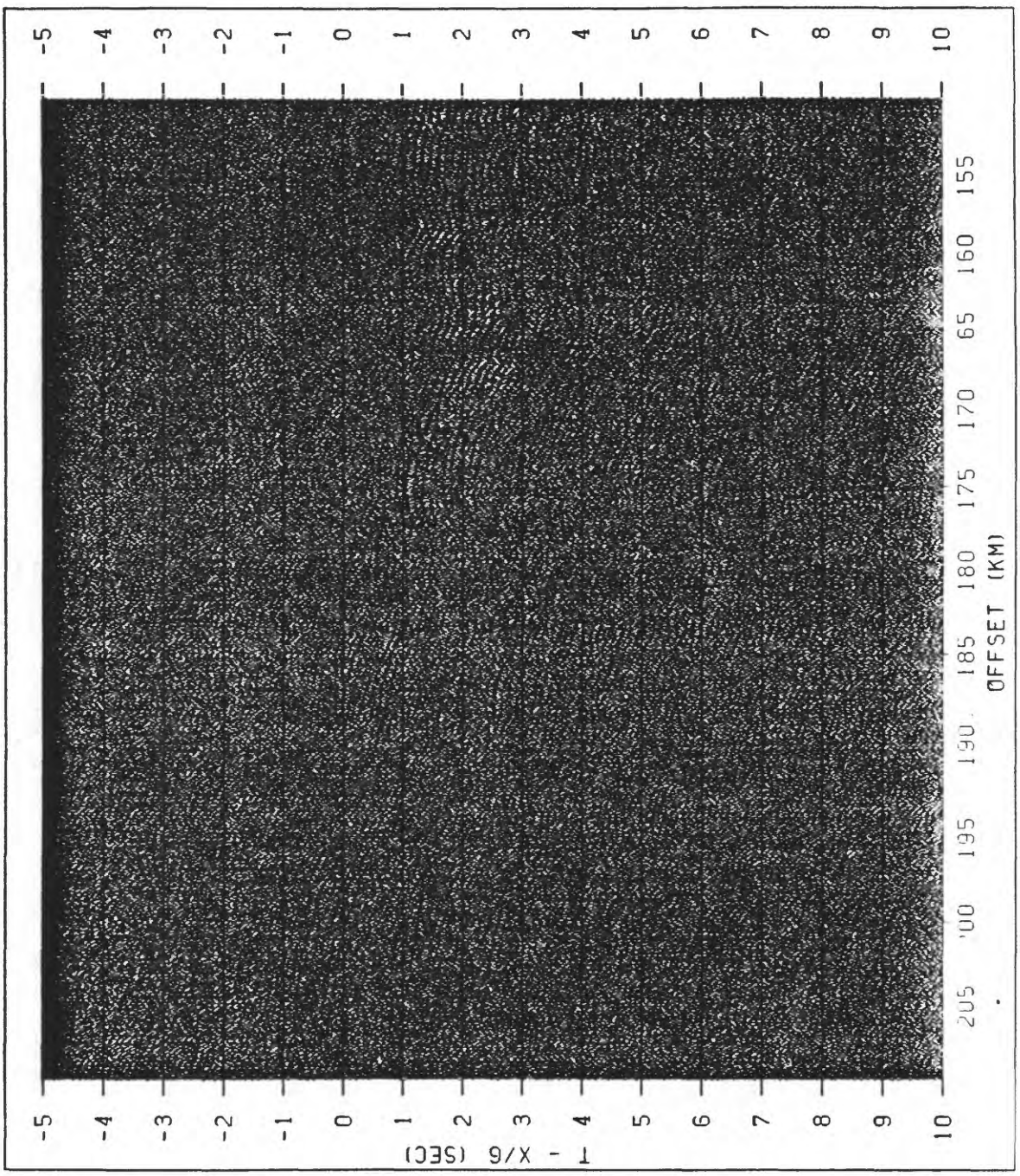


FIG. A-067. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 067
LINE 01B - GATHER 67 / STATION 0740

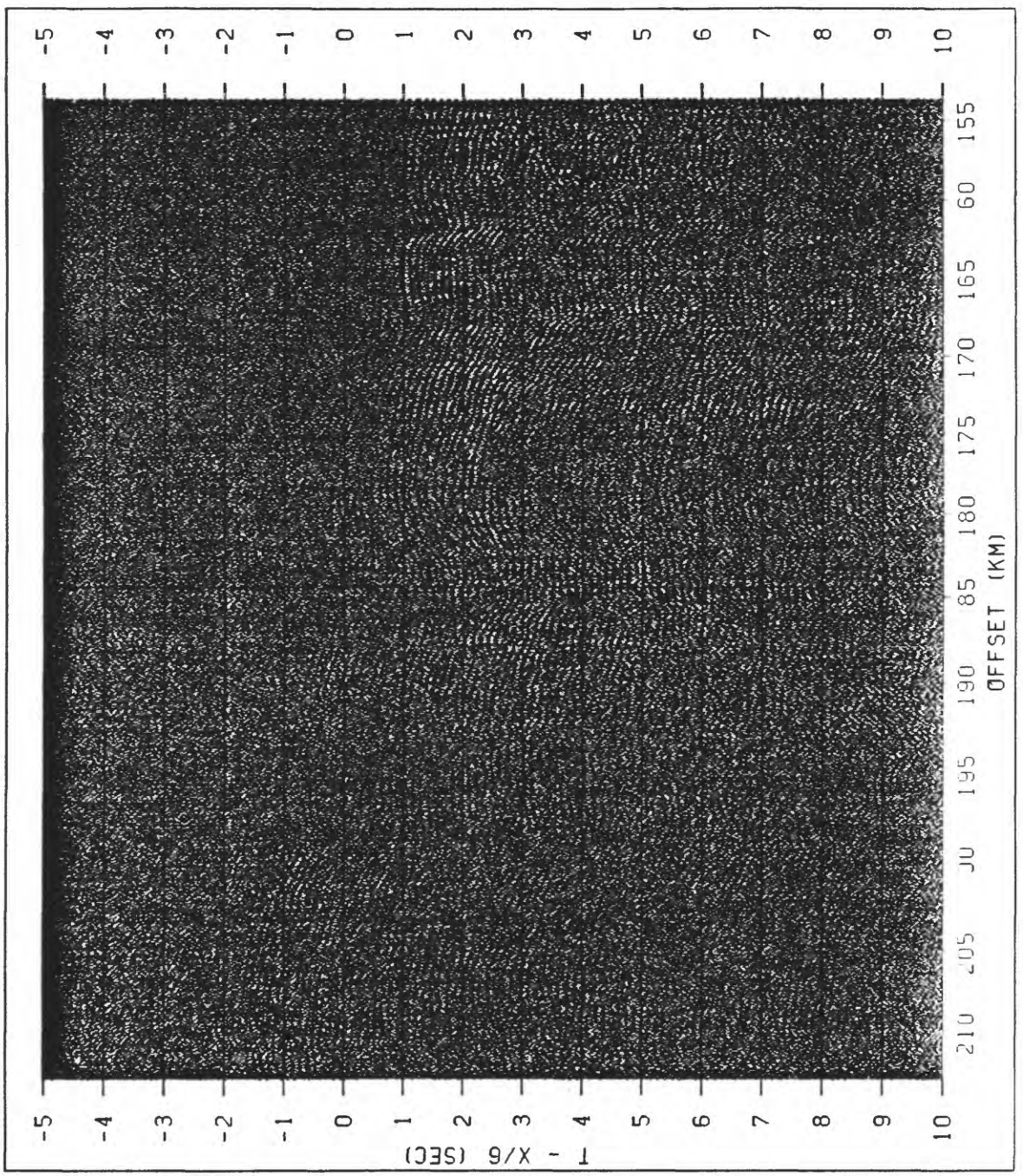


FIG. A-068. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 068
LINE 01B - GATHER 68 / STATION 0770

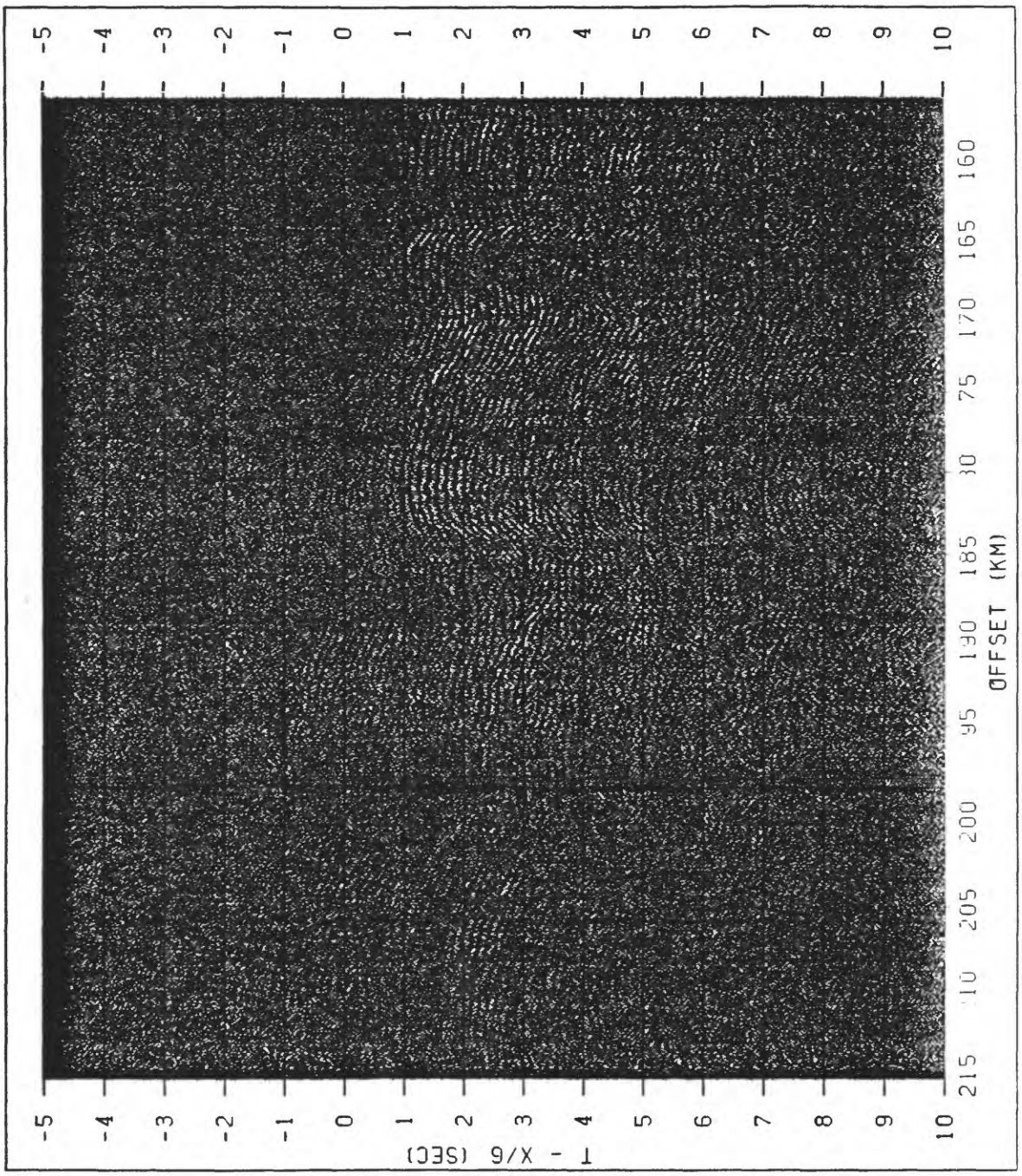


FIG. A-069. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 069
LINE 01B - GATHER 69 / STATION 0800

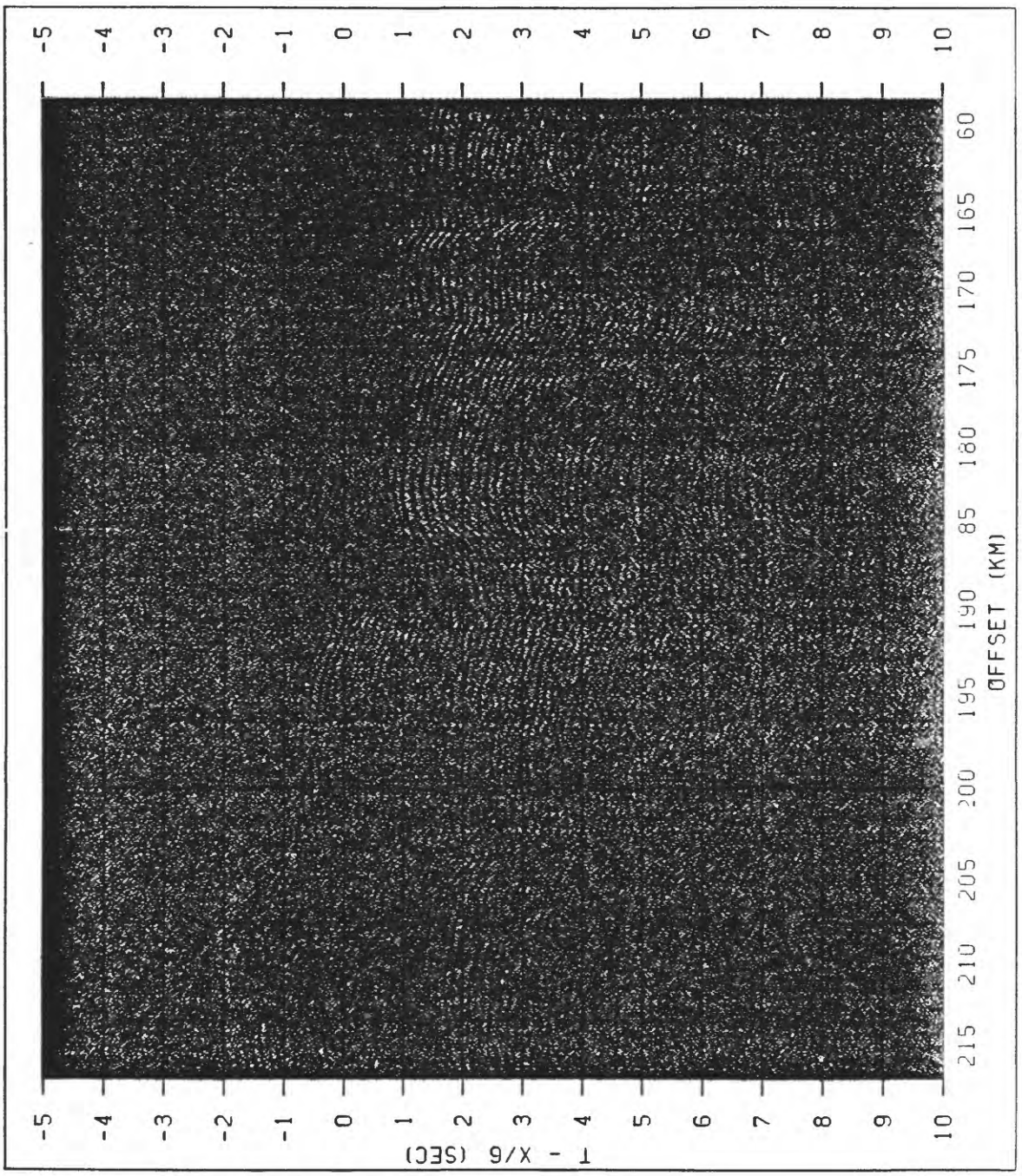


FIG. A-070. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 070
LINE 01B - GATHER 70 / STATION 0820

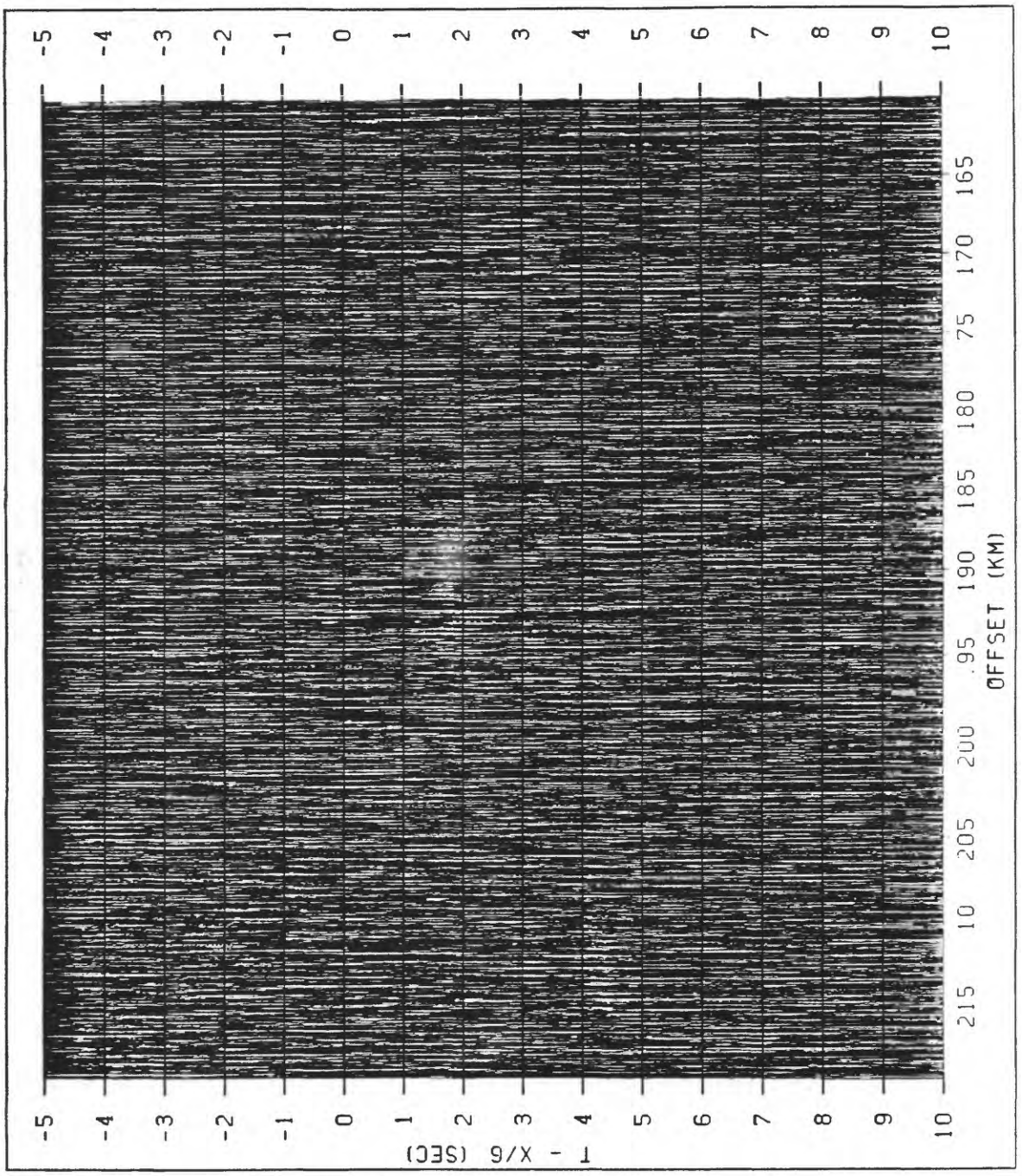


FIG. A-071. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 071
LINE 01B - GATHER 71 / STATION 0840

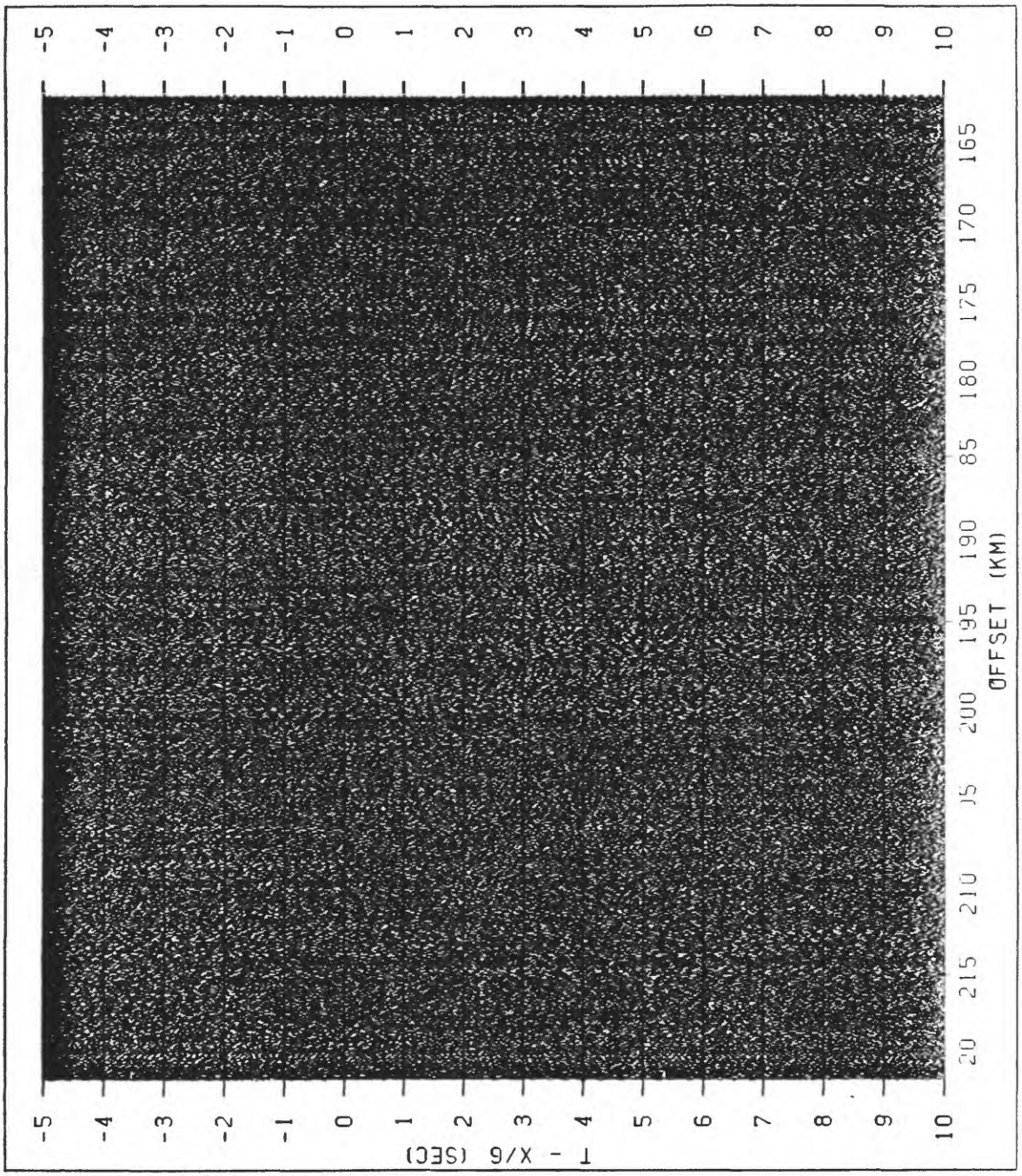


FIG. A-072. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 072
LINE 01B - GATHER 72 / STATION 0860

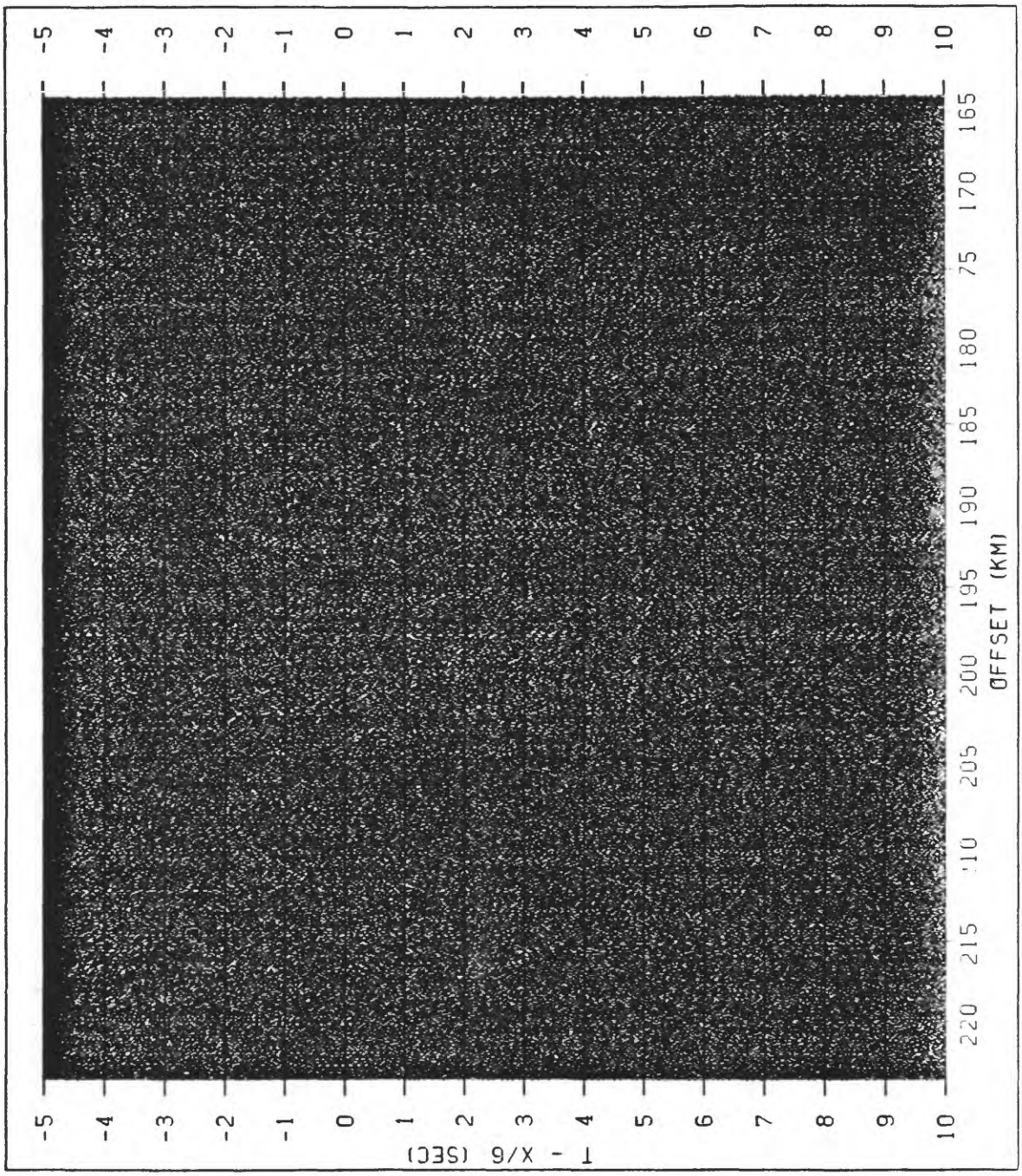


FIG. A-073. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 073
LINE 01B - GATHER 73 / STATION 0880

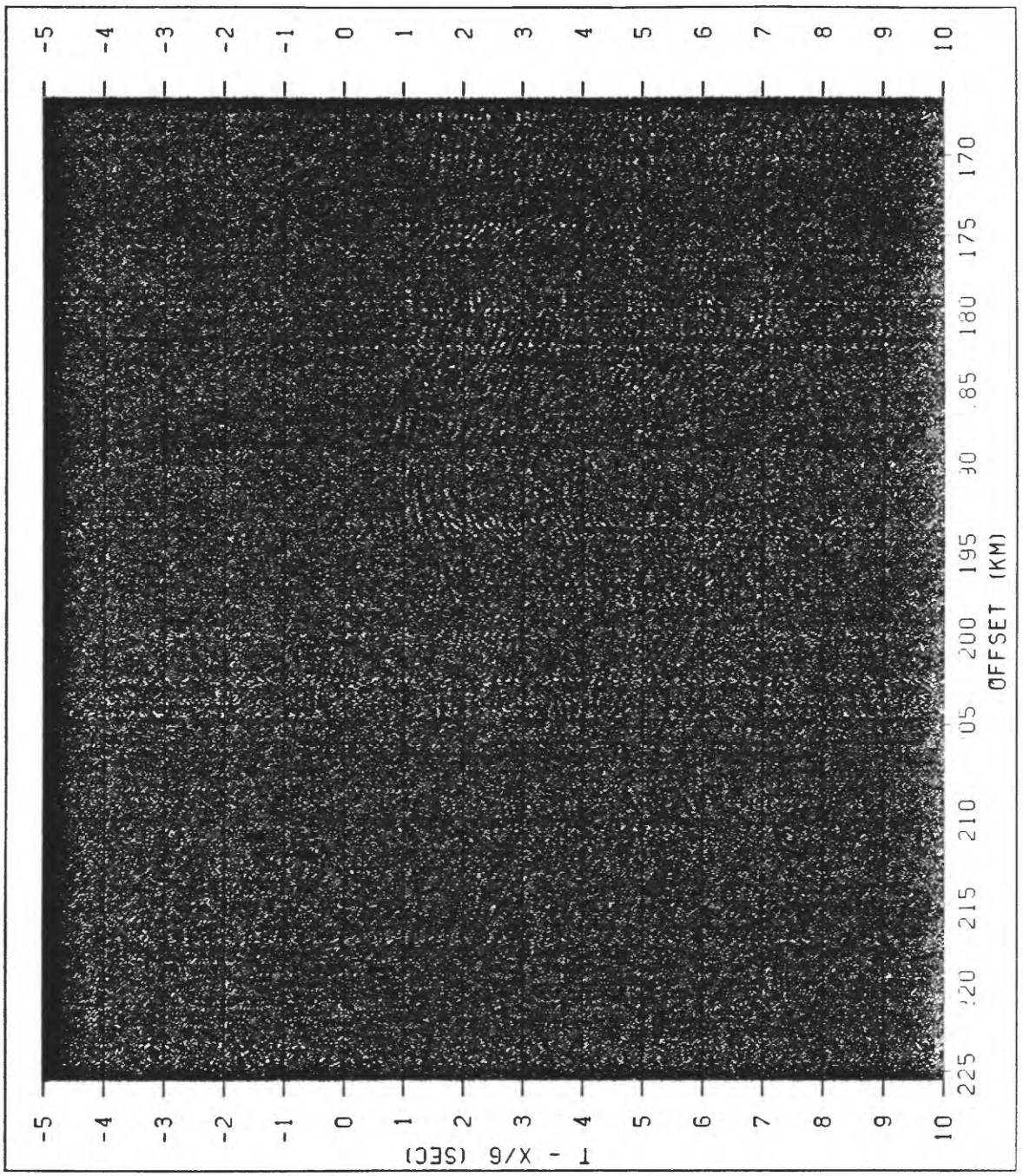


FIG. A-074. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 074
LINE 01B - GATHER 74 / STATION 0900

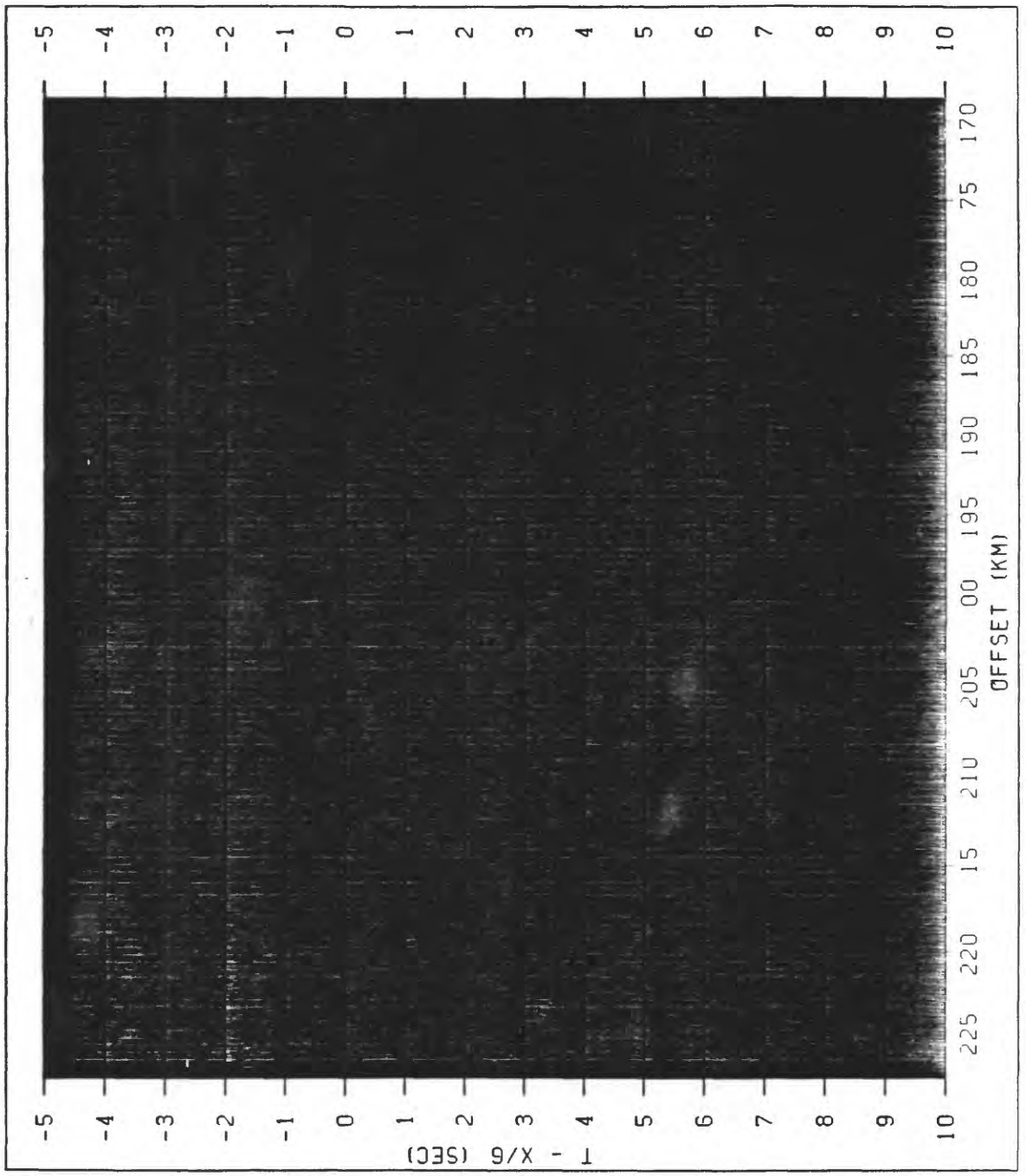


FIG. A-075. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 075
LINE 01B - GATHER 75 / STATION 0920

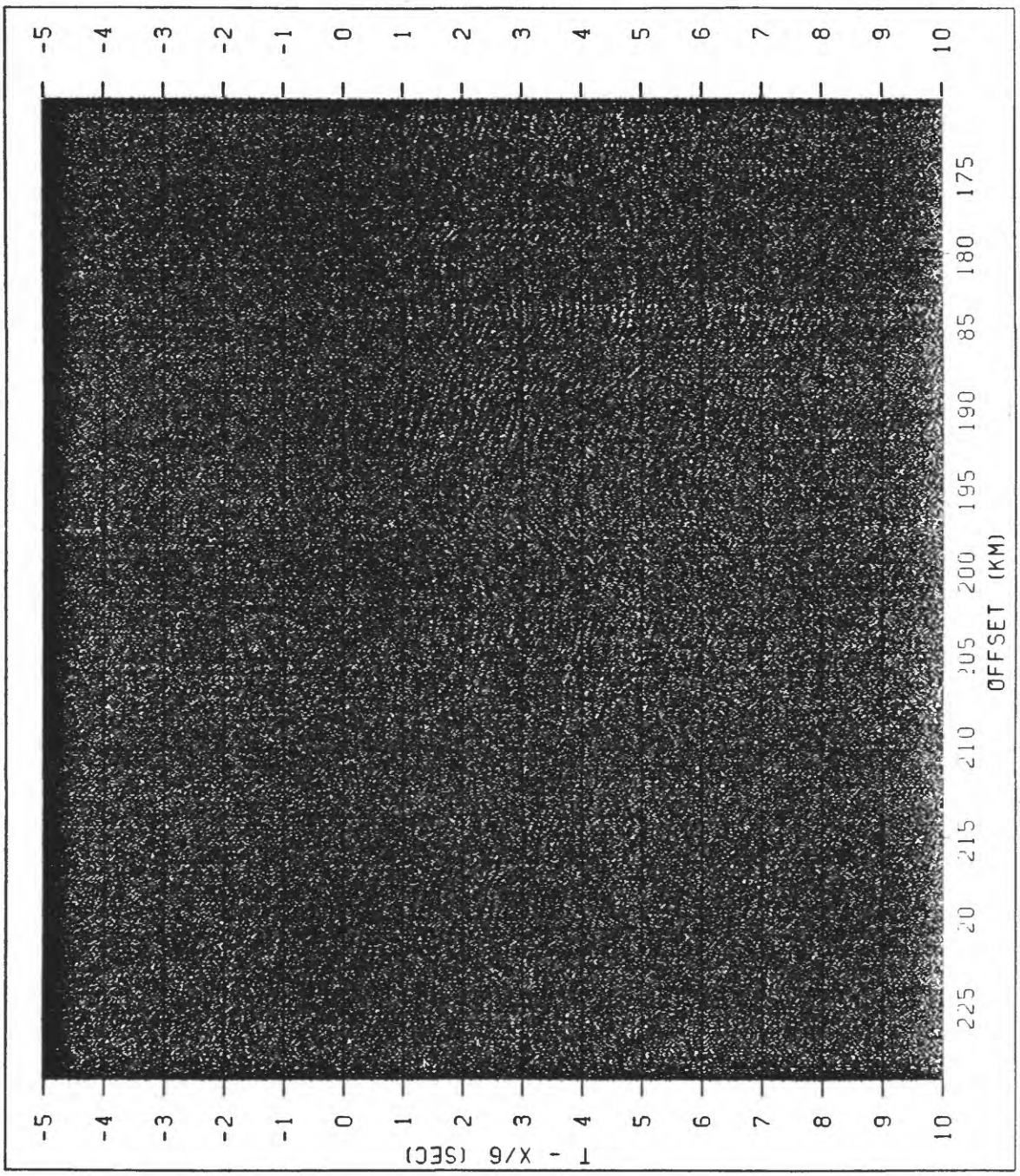


FIG. A-076. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 076
LINE 01B - GATHER 76 / STATION 0940

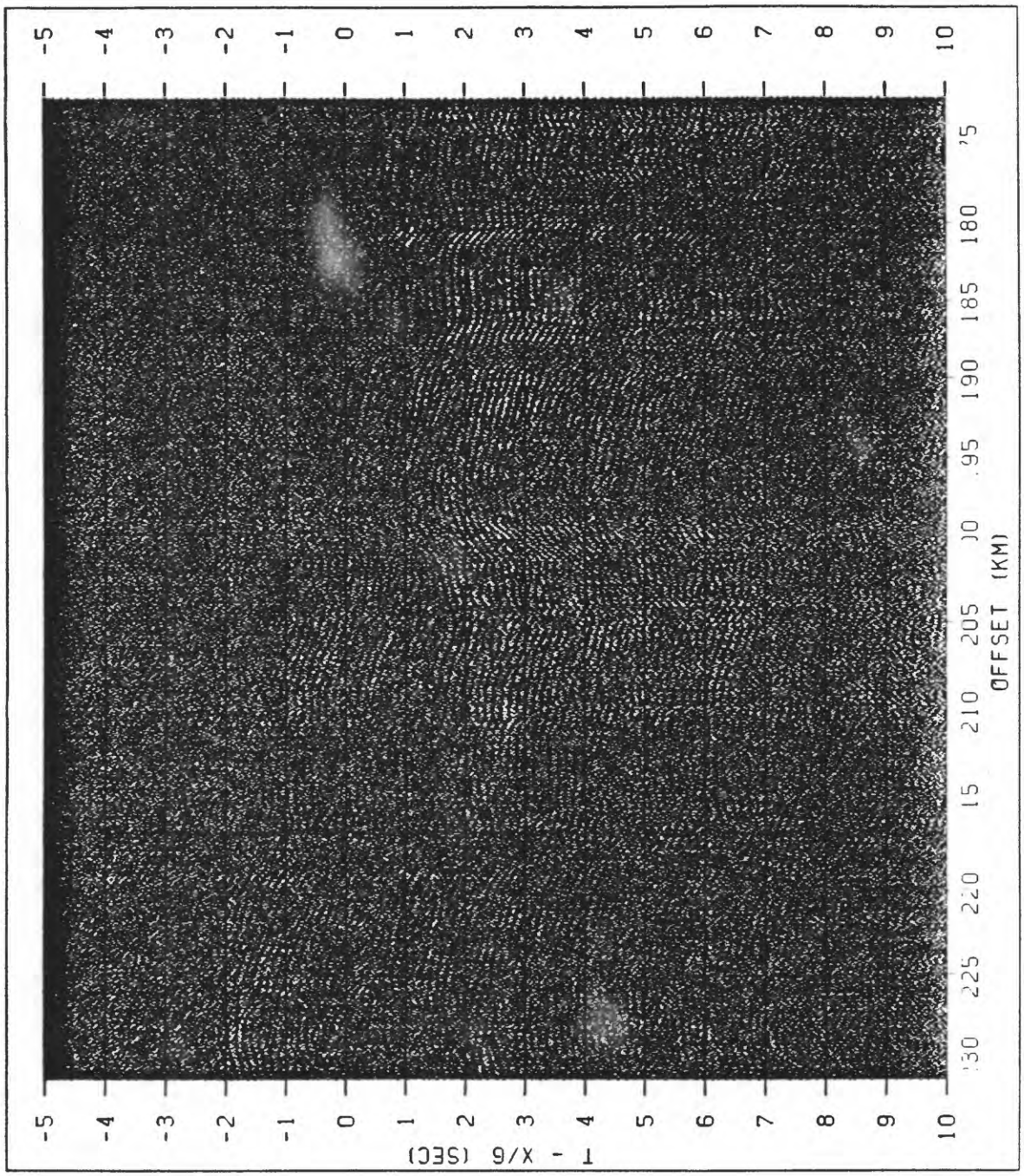


FIG. A-077. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 077
LINE 01B - GATHER 77 / STATION 0960

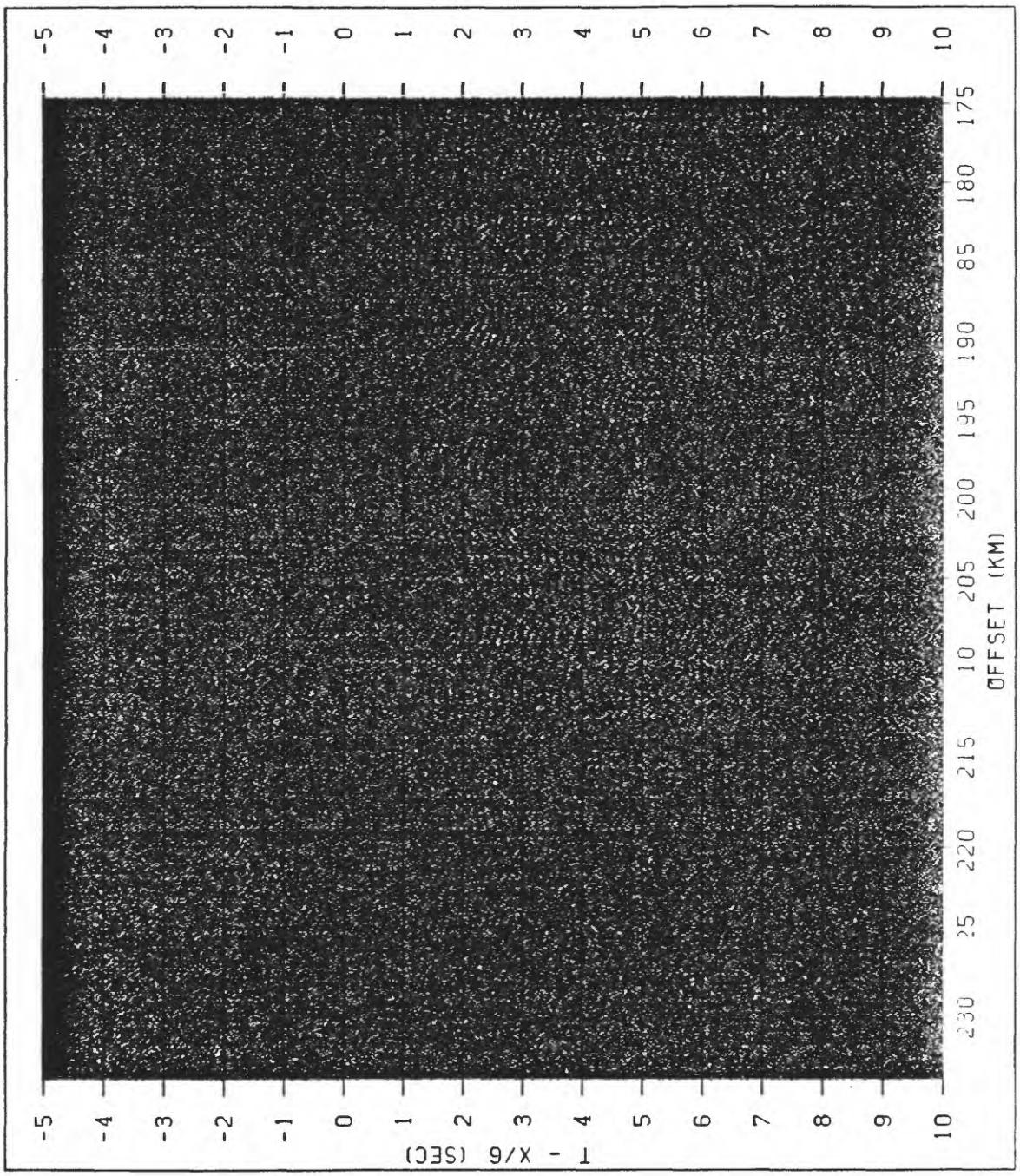


FIG. A-078. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 078
LINE 01B - GATHER 78 / STATION 0980

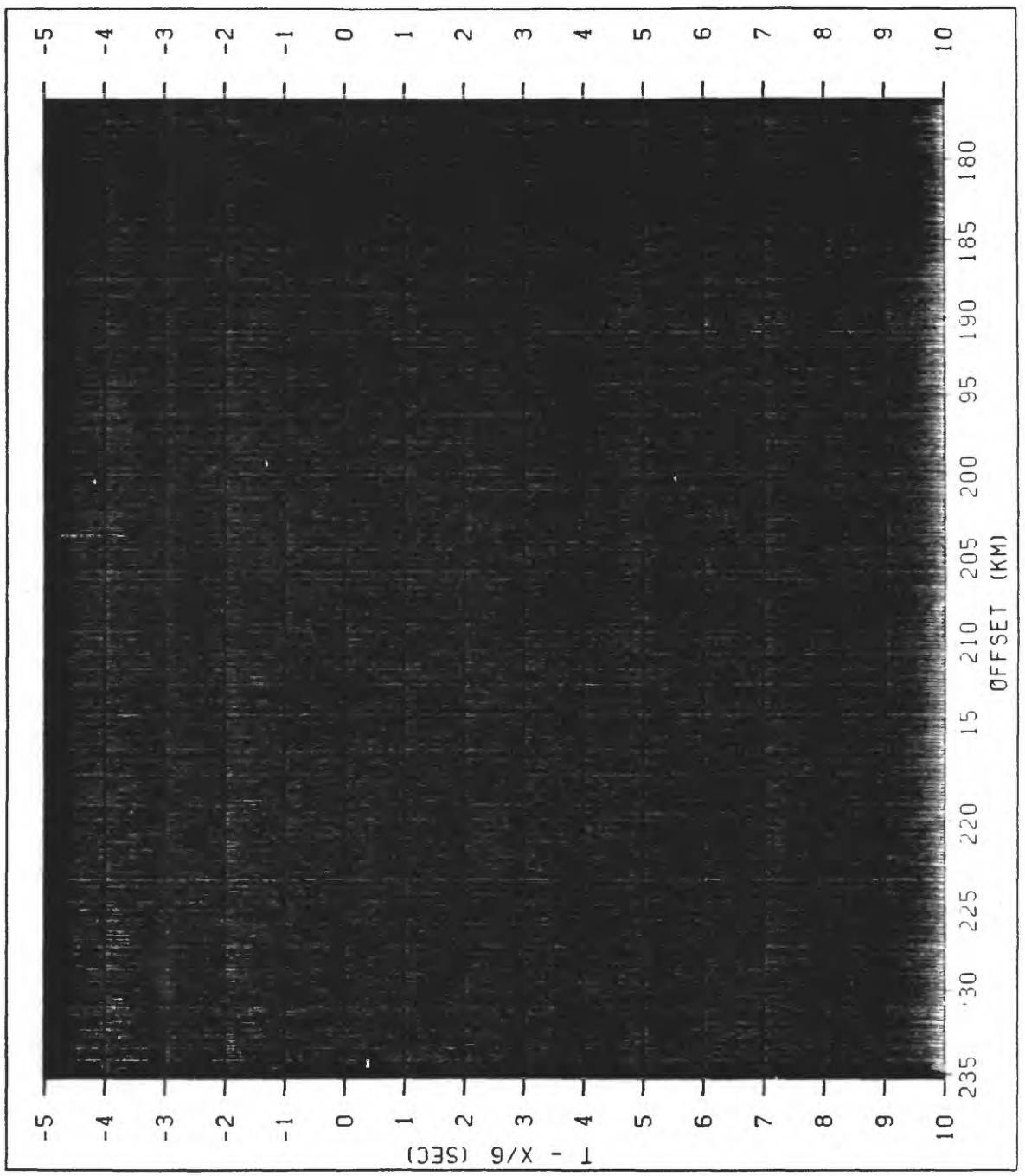


FIG. A-079. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 079
LINE 01B - GATHER 79 / STATION 1000

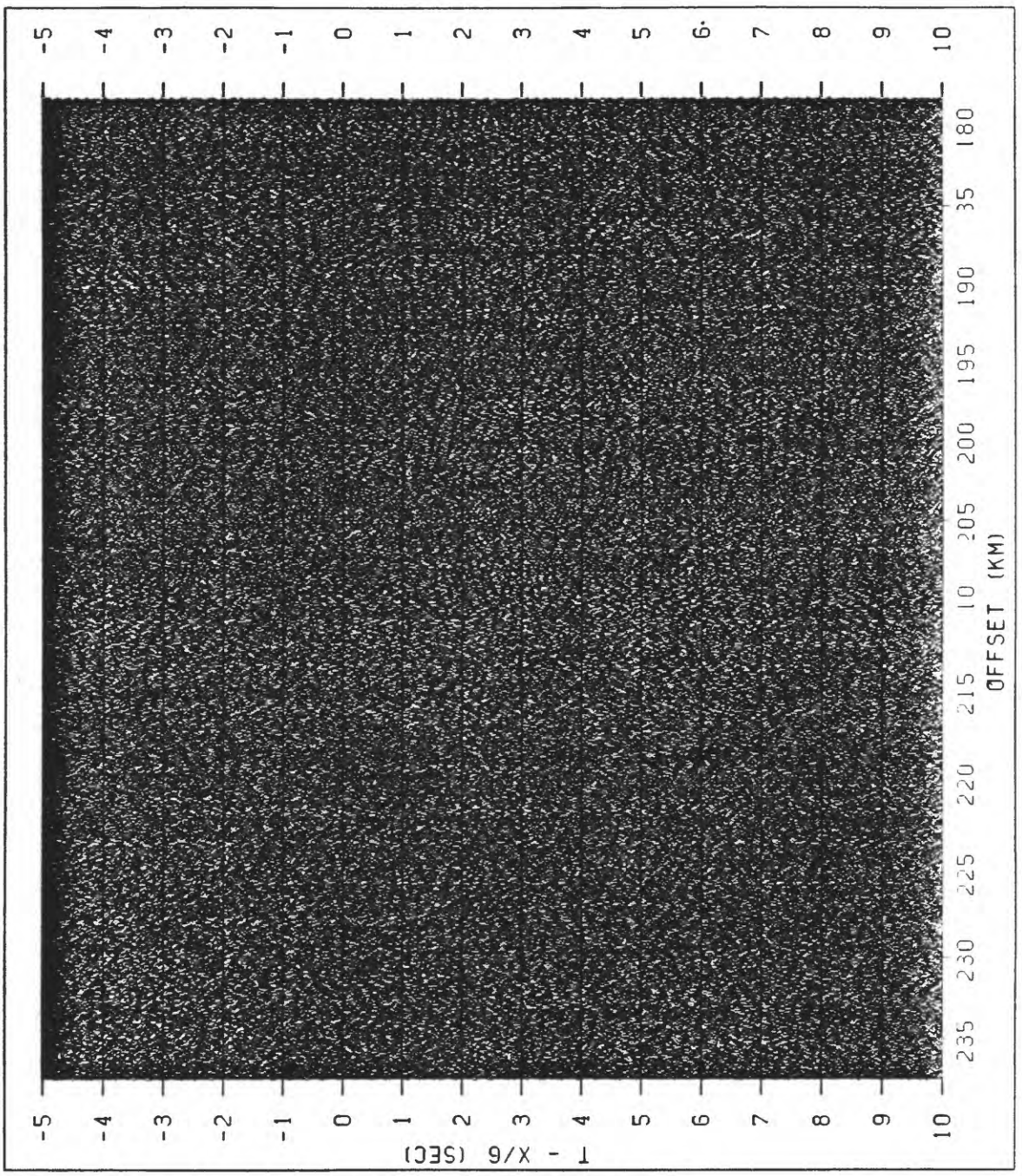


FIG. A-080. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 080
LINE 01B - GATHER 80 / STATION 1020

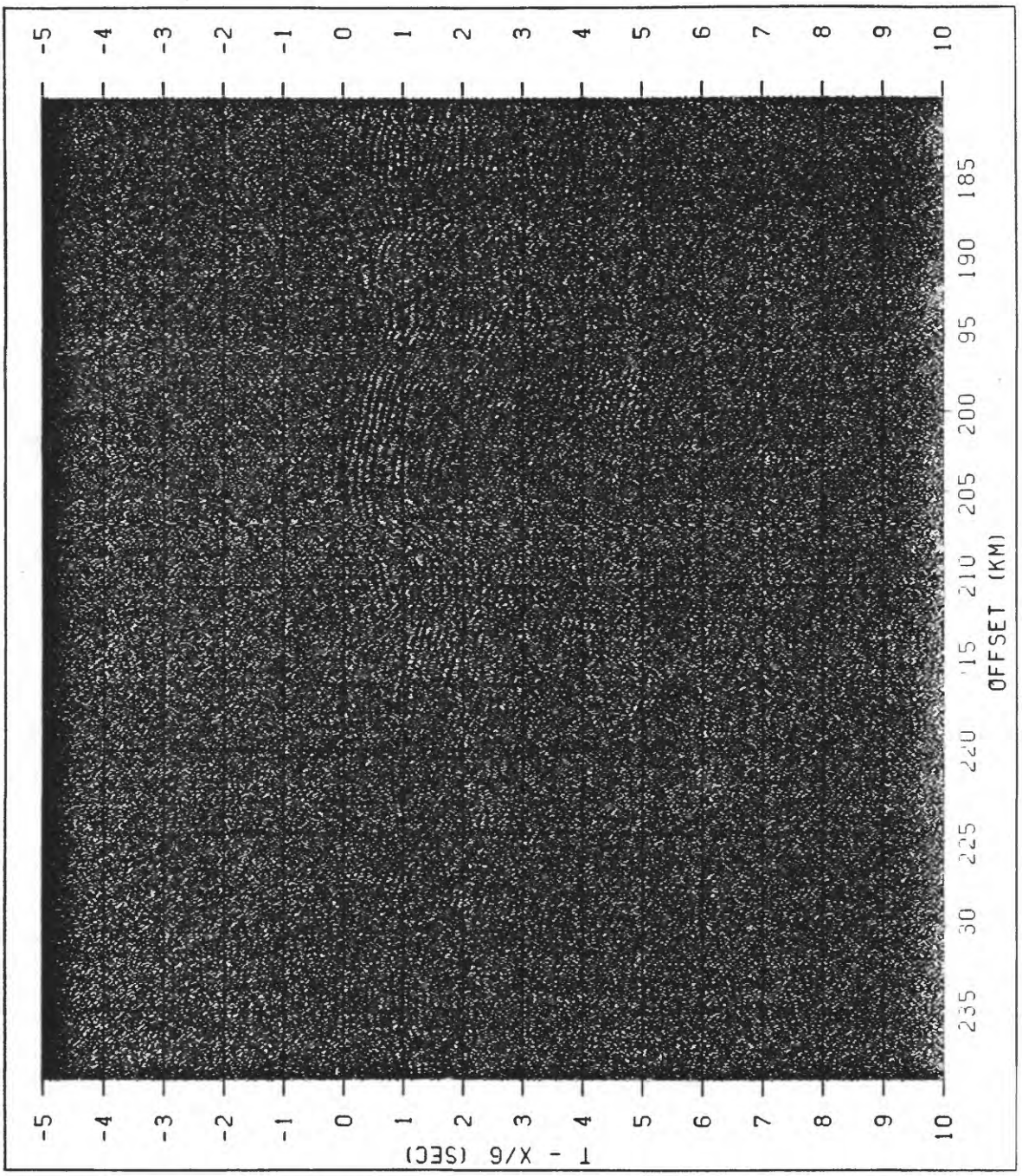


FIG. A-081. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 081
LINE 01B - GATHER 81 / STATION 1040

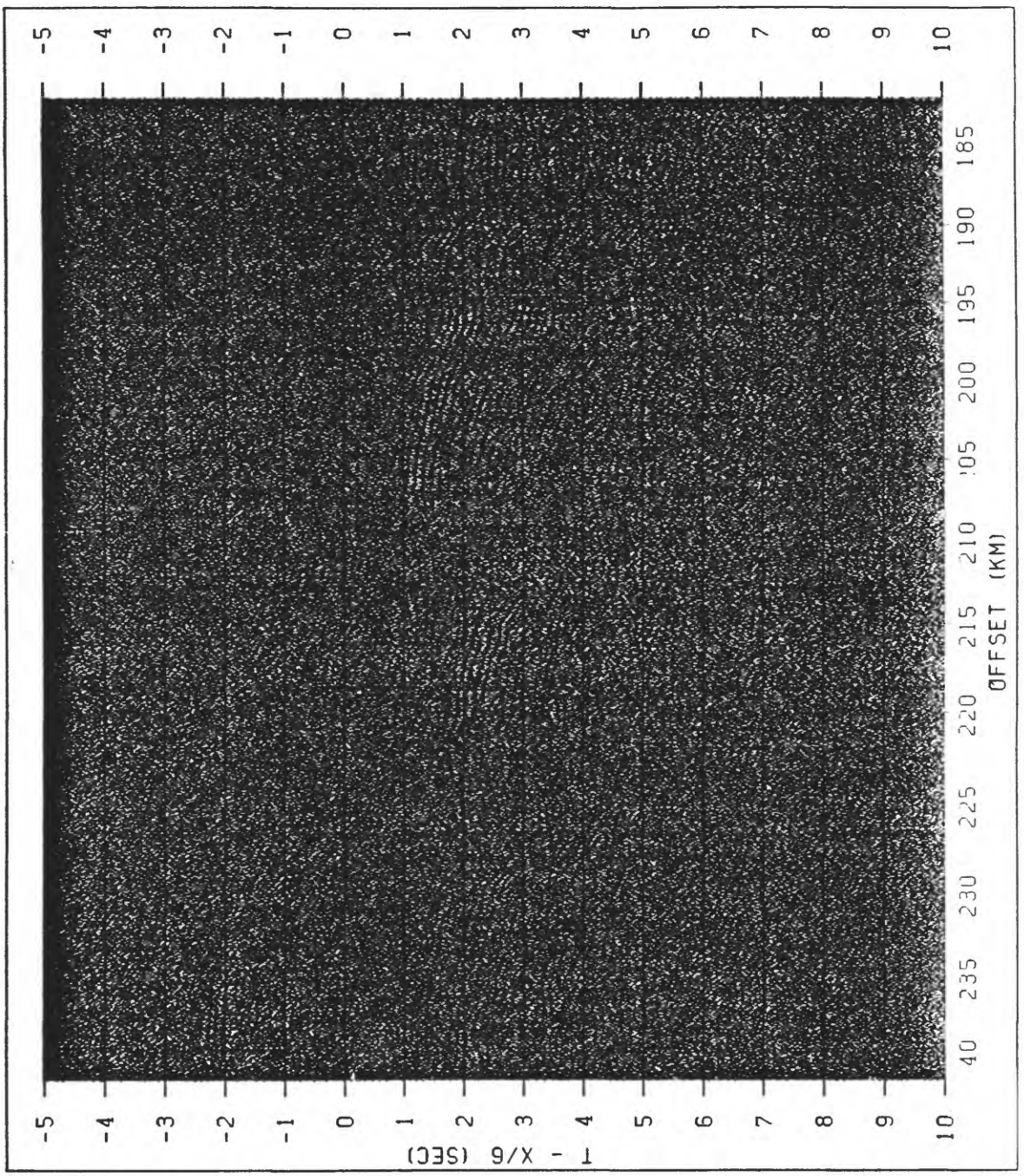


FIG. A-082. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 082
LINE 01B - GATHER 82 / STATION 1060

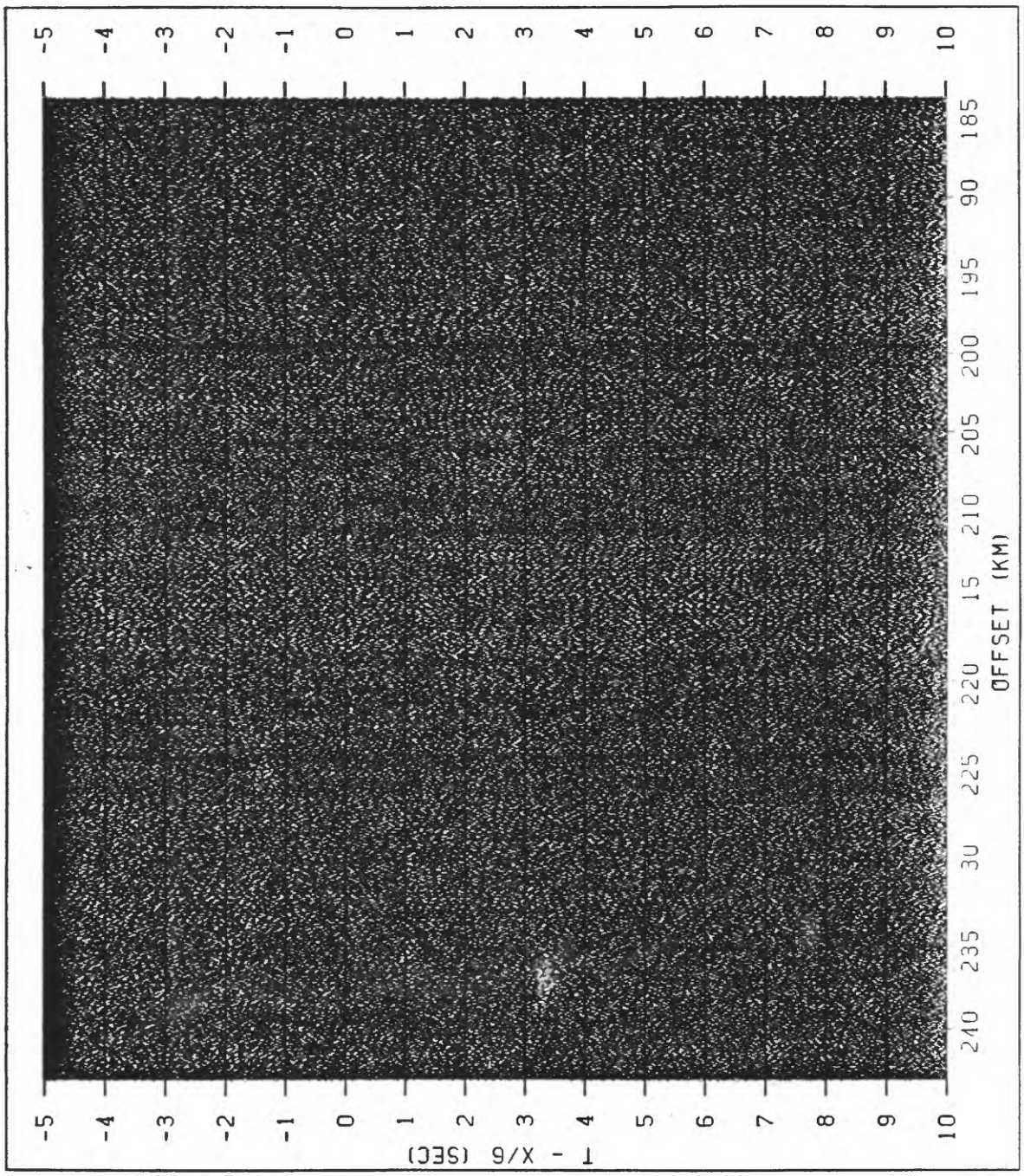


FIG. A-083. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 083
LINE 01B - GATHER 83 / STATION 1080

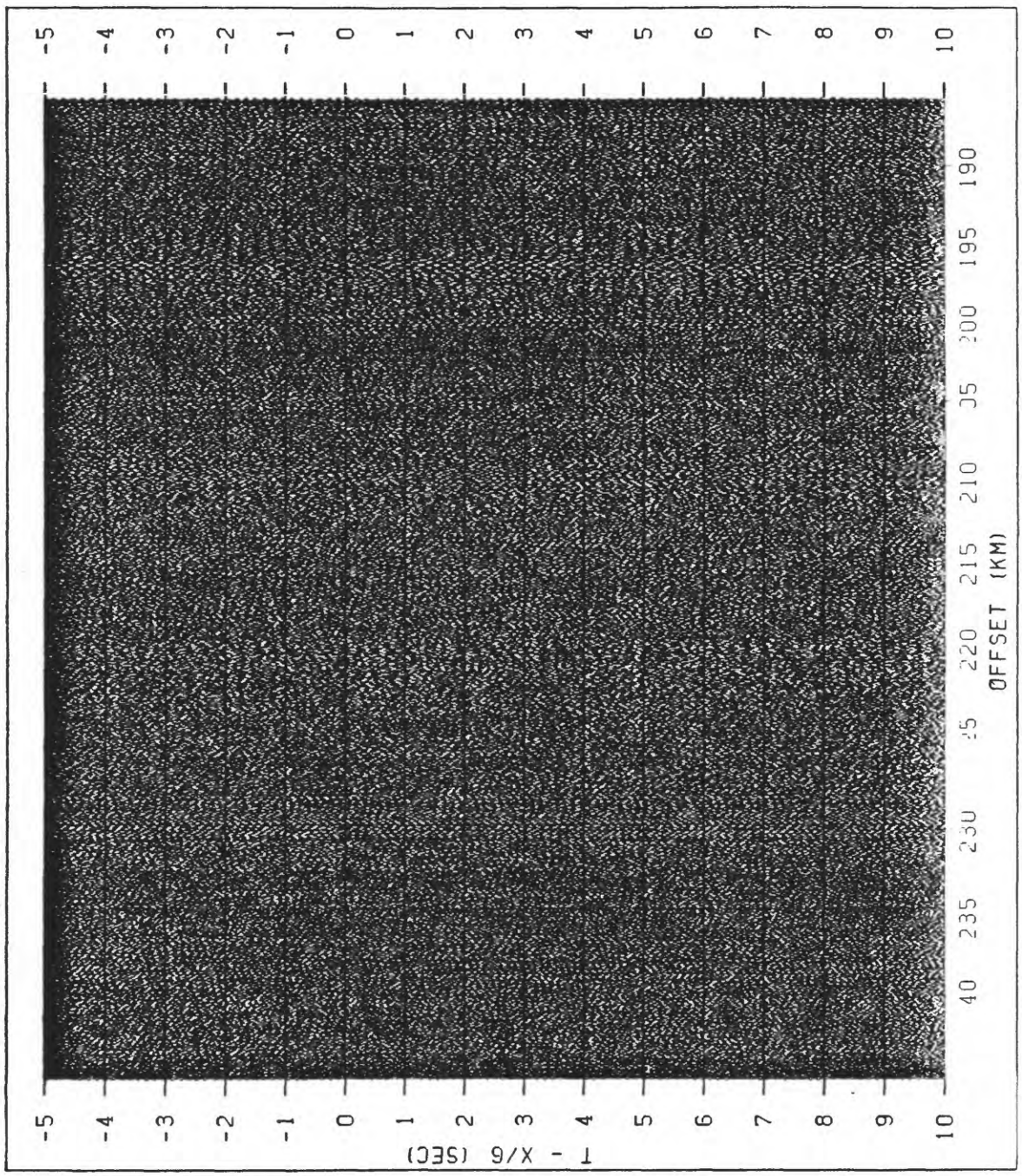


FIG. A-084. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 084
LINE 01B - GATHER 84 / STATION 1100

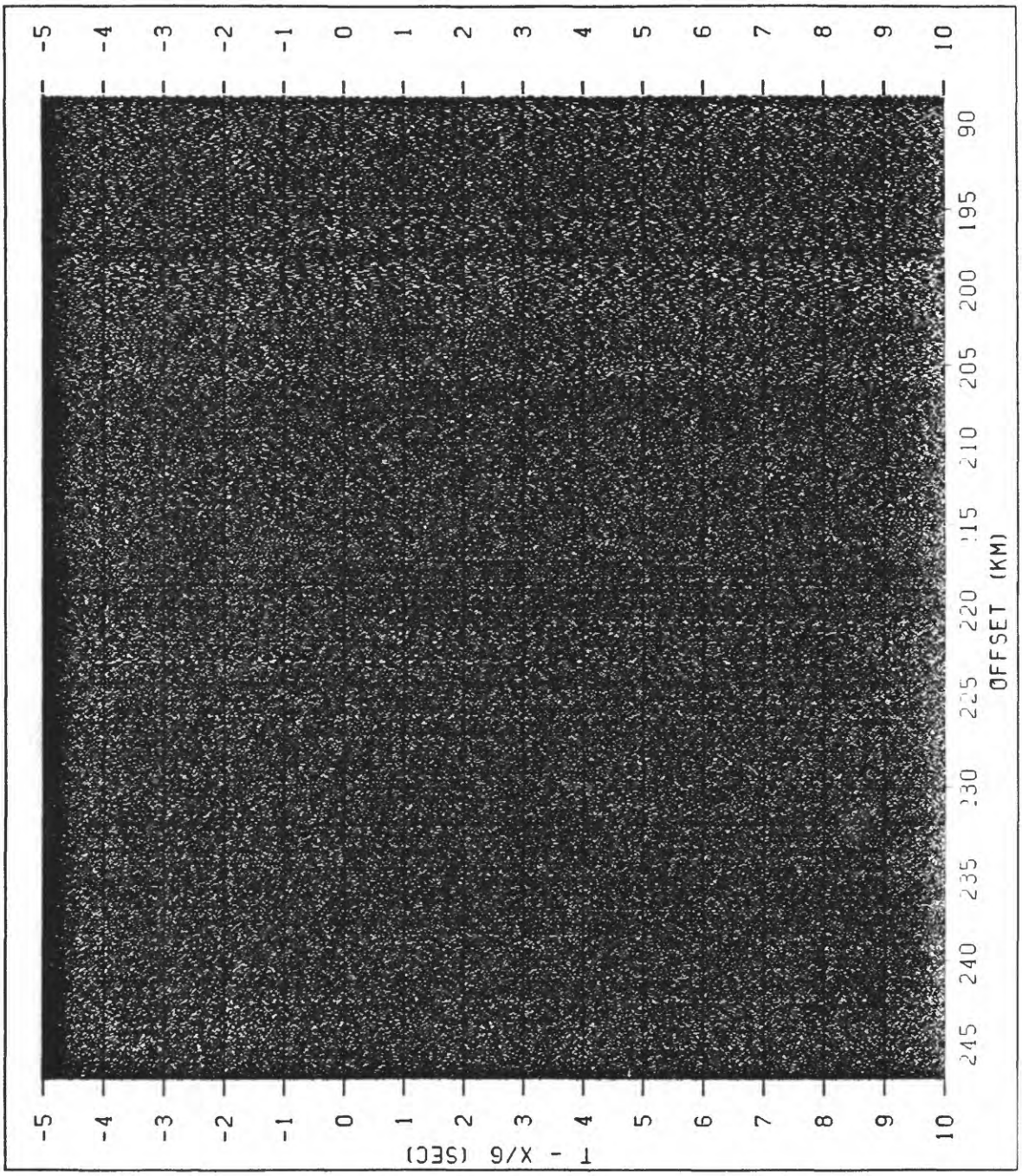


FIG. A-085. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 085
LINE 01B - GATHER 85 / STATION 1120

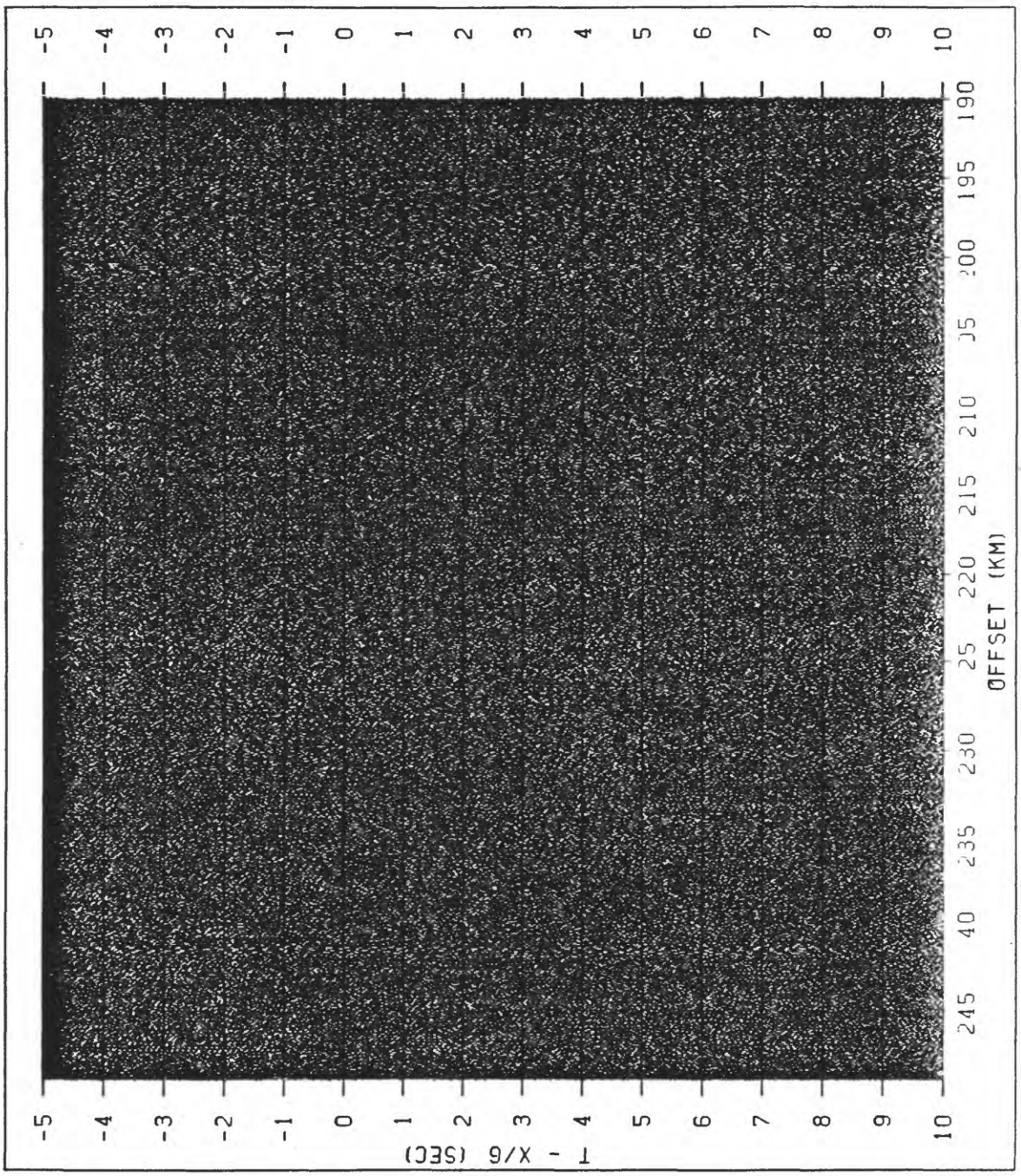


FIG. A-086. ONSHORE-OFFSHORE / 2-TRACE SUM
SHIP TRACK 16 / OVERALL GATHER 086
LINE 01B - GATHER 86 / STATION 1140

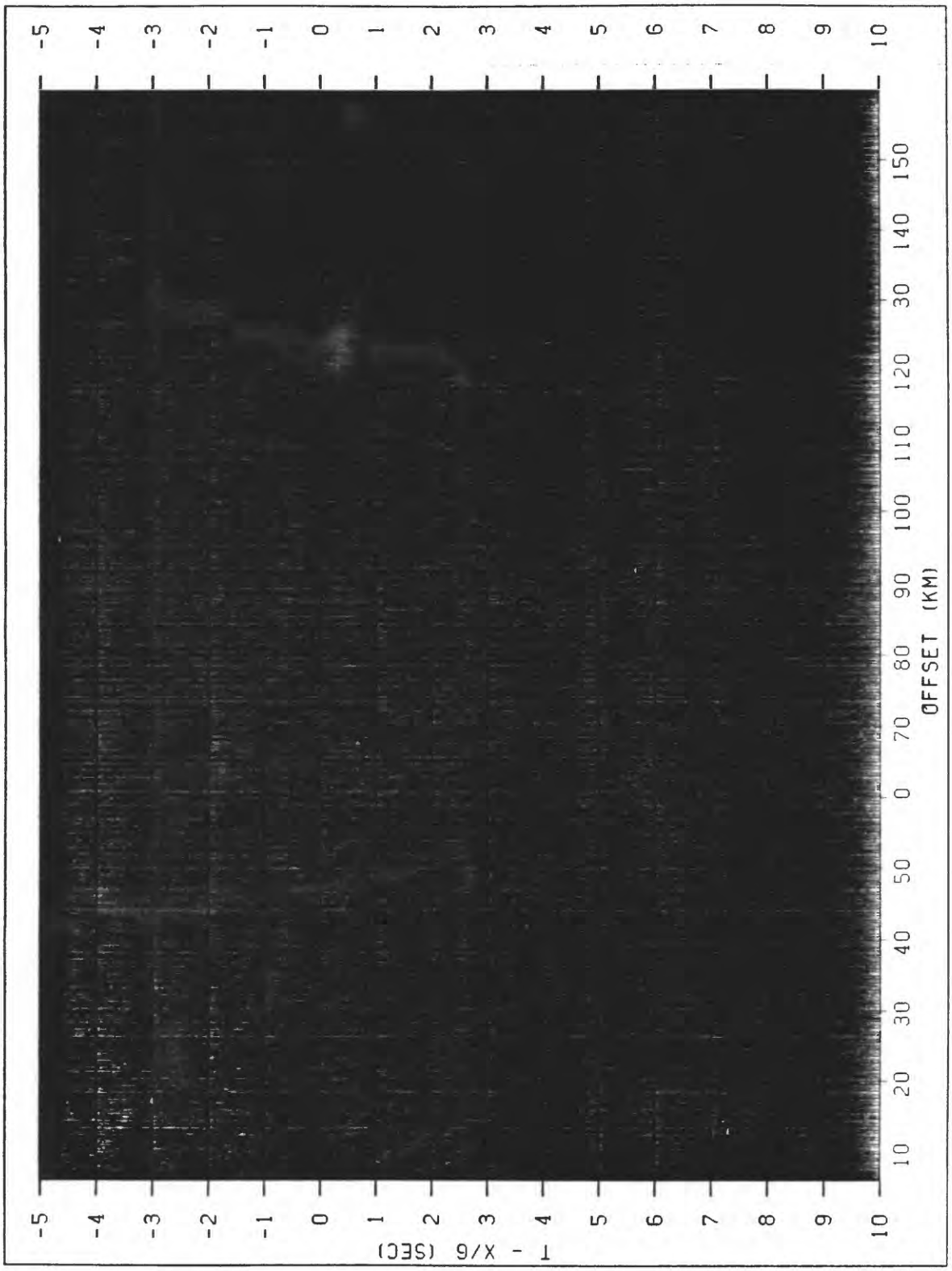


FIG. A-087. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 087
LINE 02 - GATHER 01 / STATION 7001

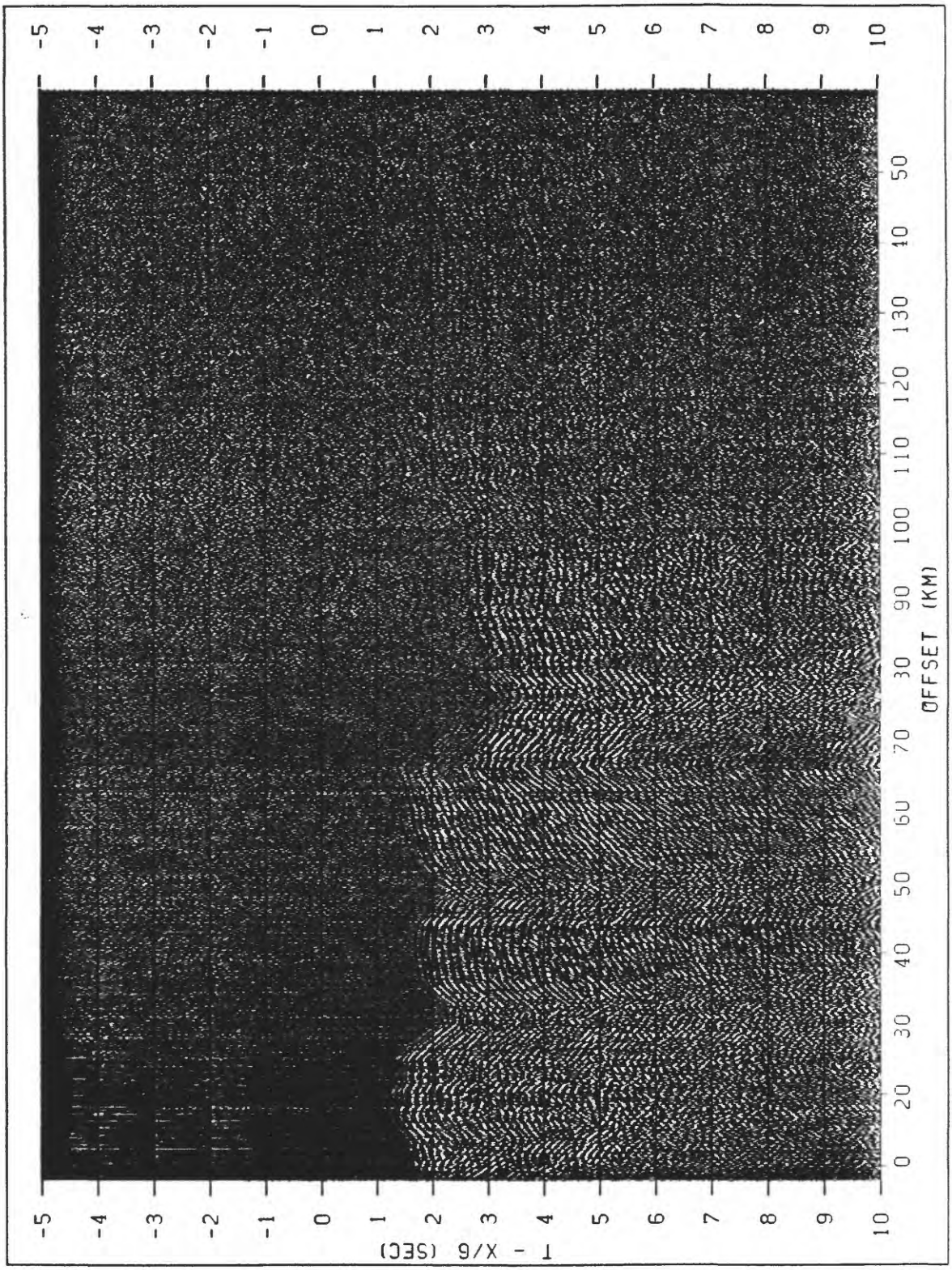


FIG. A-088. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 088
LINE 02 - GATHER 02 / STATION 7002

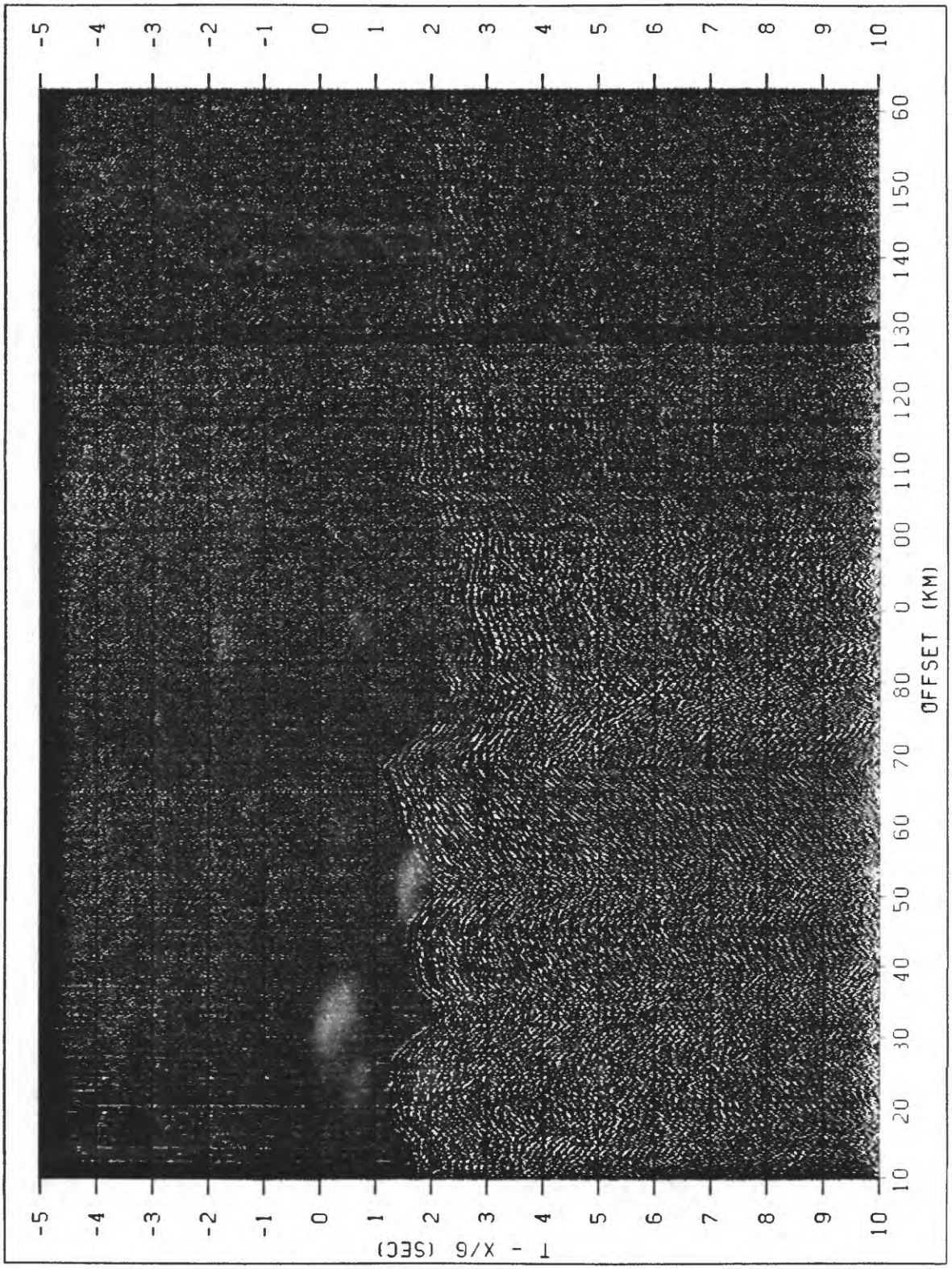


FIG. A-089. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 089
LINE 02 - GATHER 03 / STATION 7003

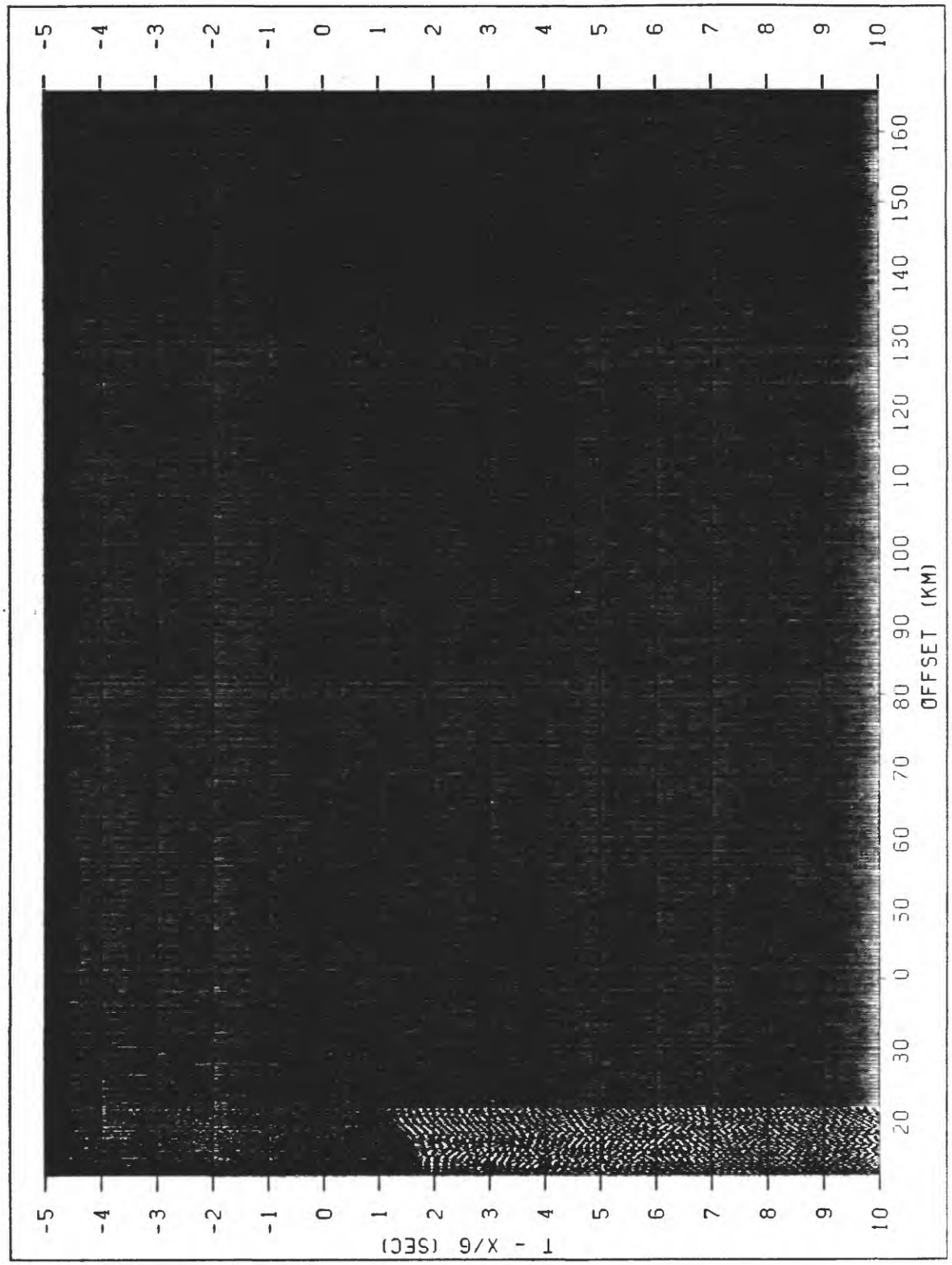


FIG. A-090. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 090
LINE 02 - GATHER 04 / STATION 7004

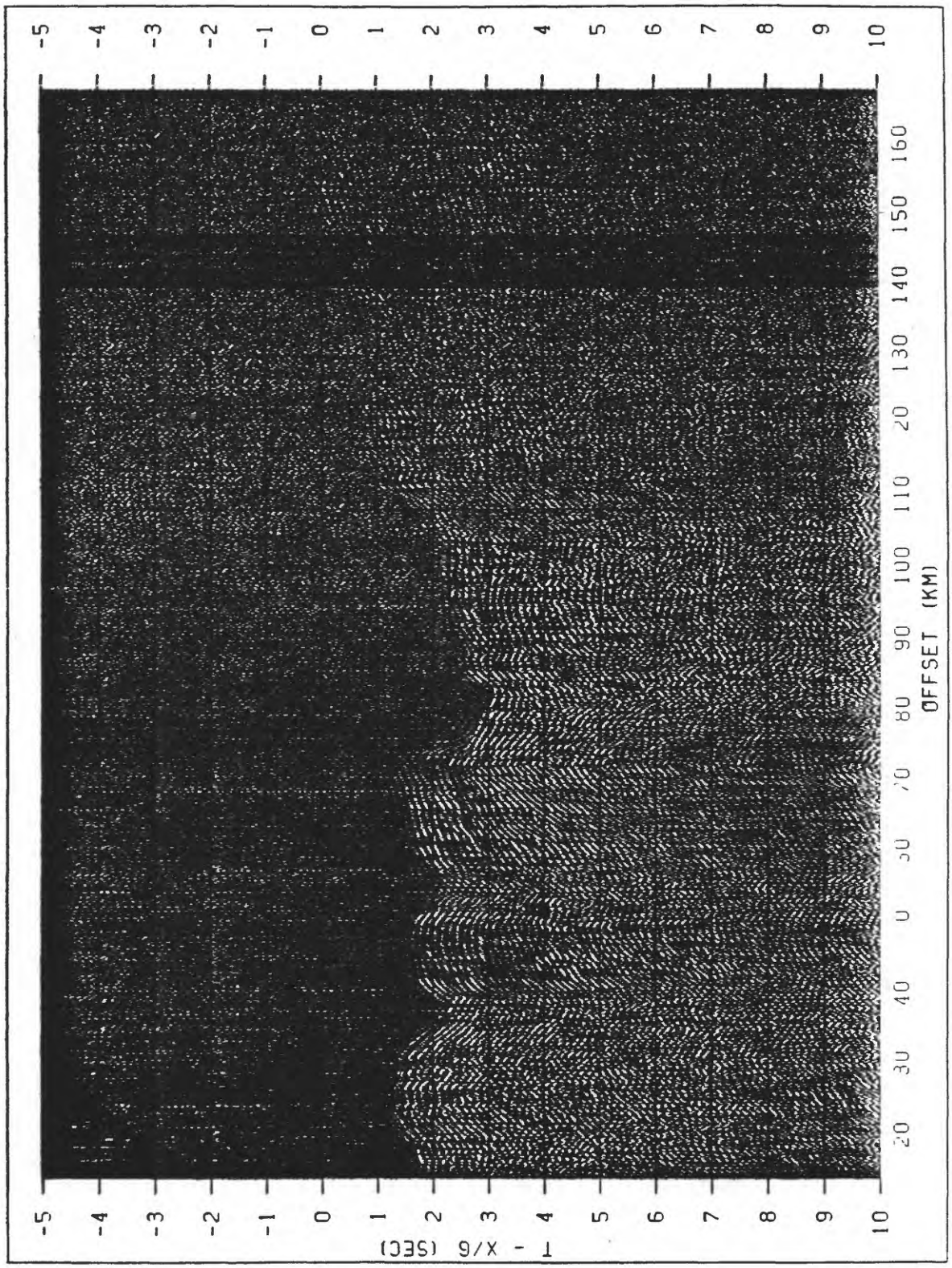


FIG. A-091. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 091
LINE 02 - GATHER 05 / STATION 7005

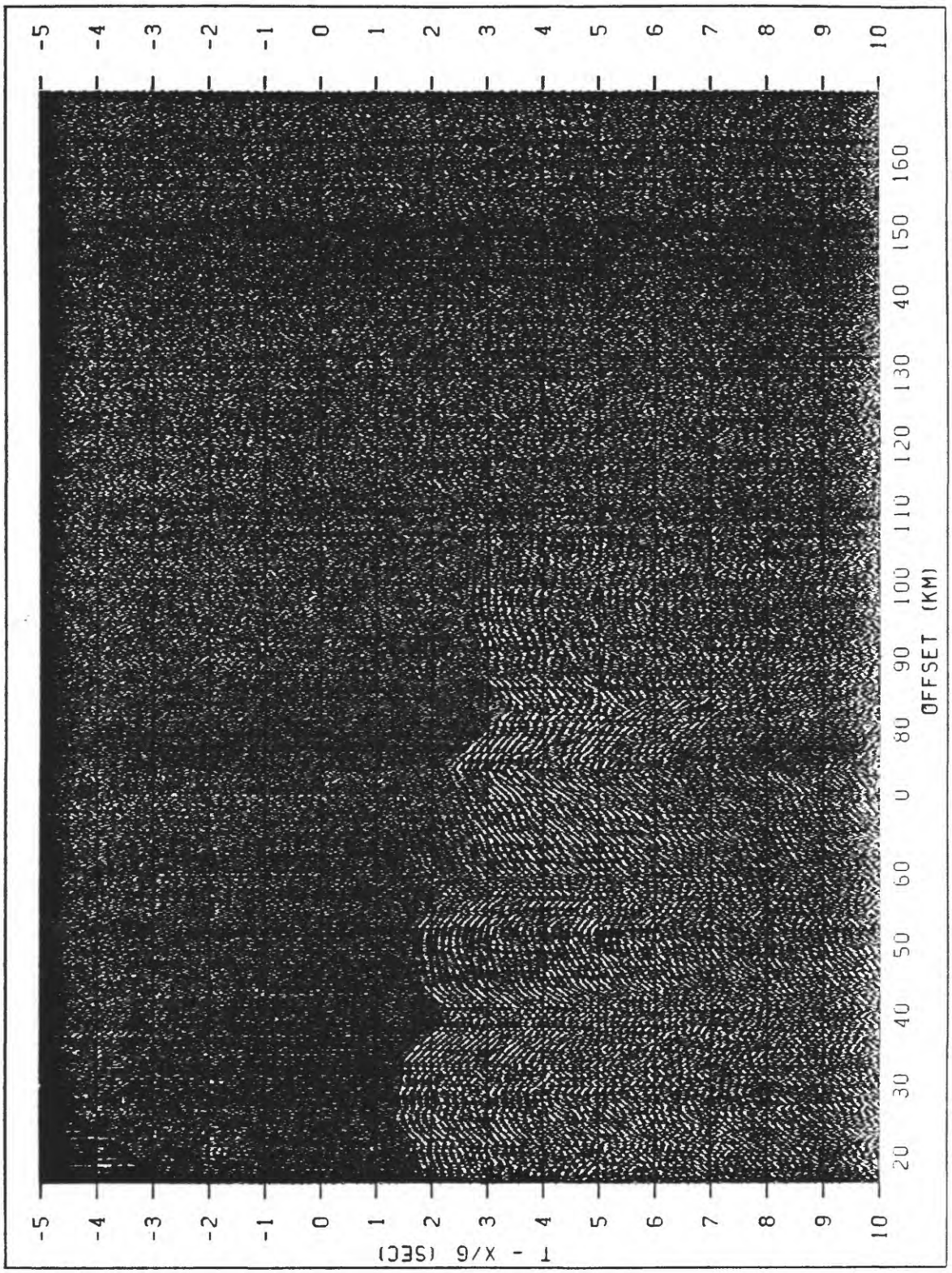


FIG. A-092. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 092
LINE 02 - GATHER 06 / STATION 7006

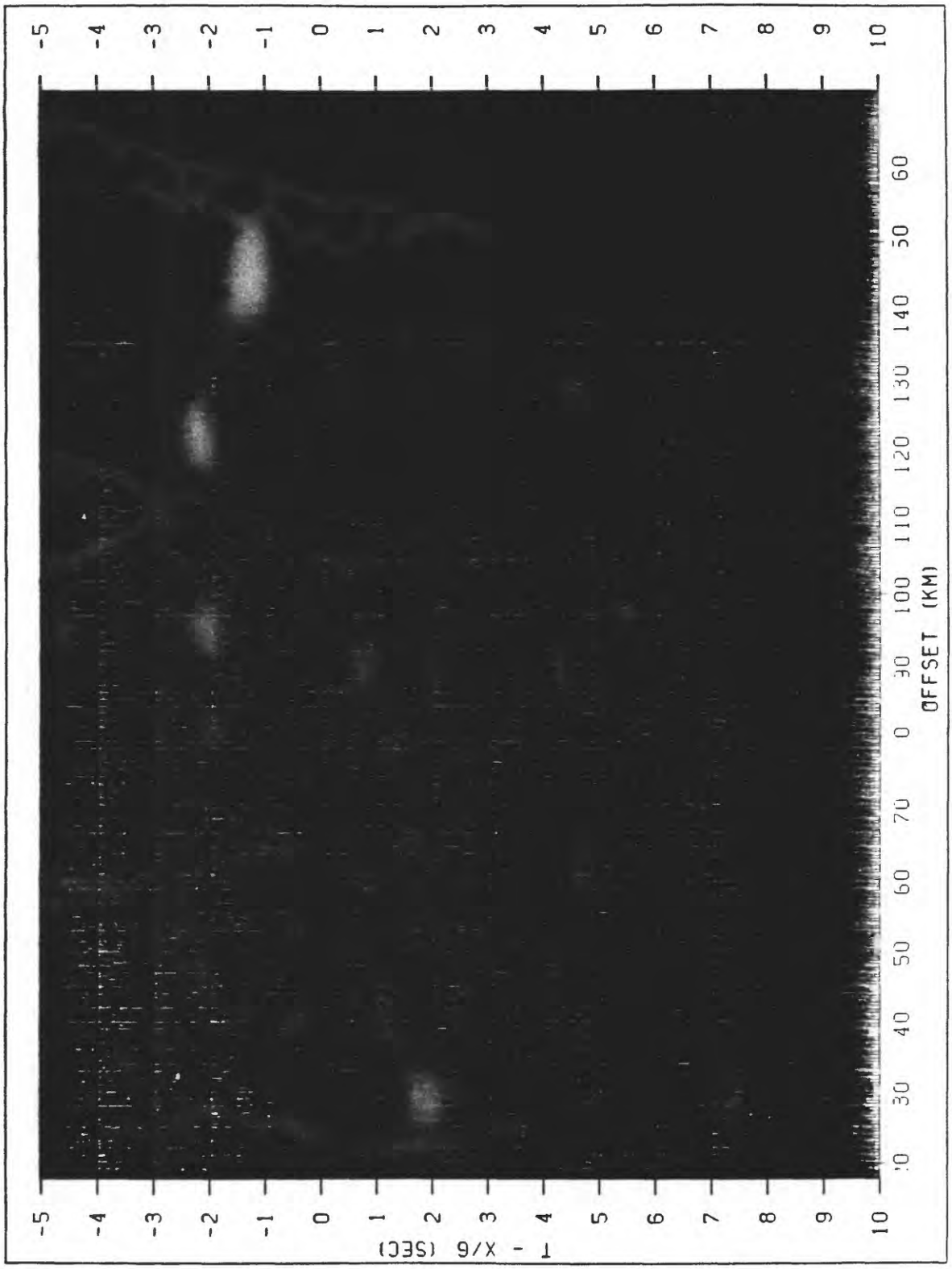


FIG. A-093. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 093
LINE 02 - GATHER 07 / STATION 7007

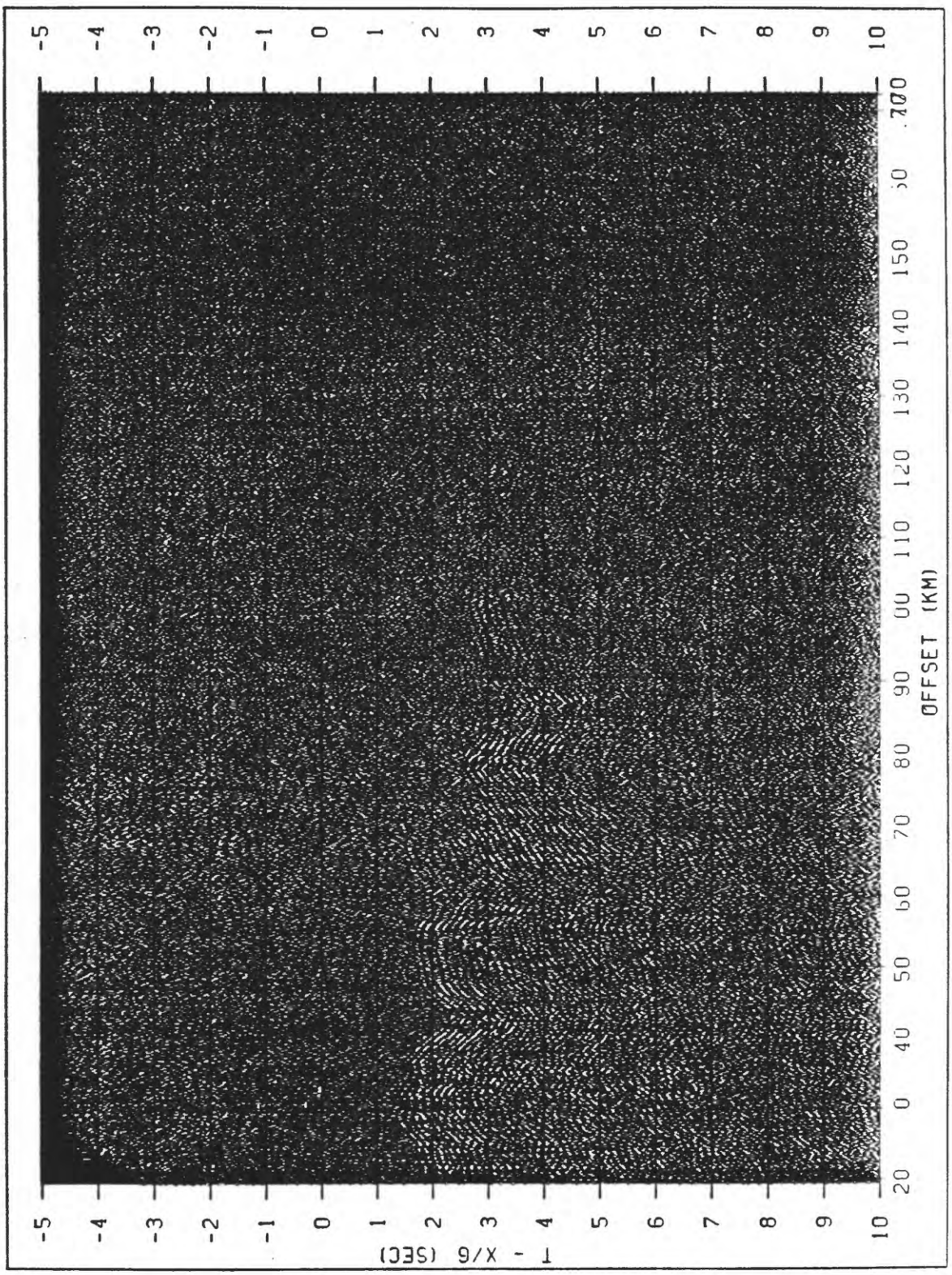


FIG. A-094. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 094
LINE 02 - GATHER 08 / STATION 7008

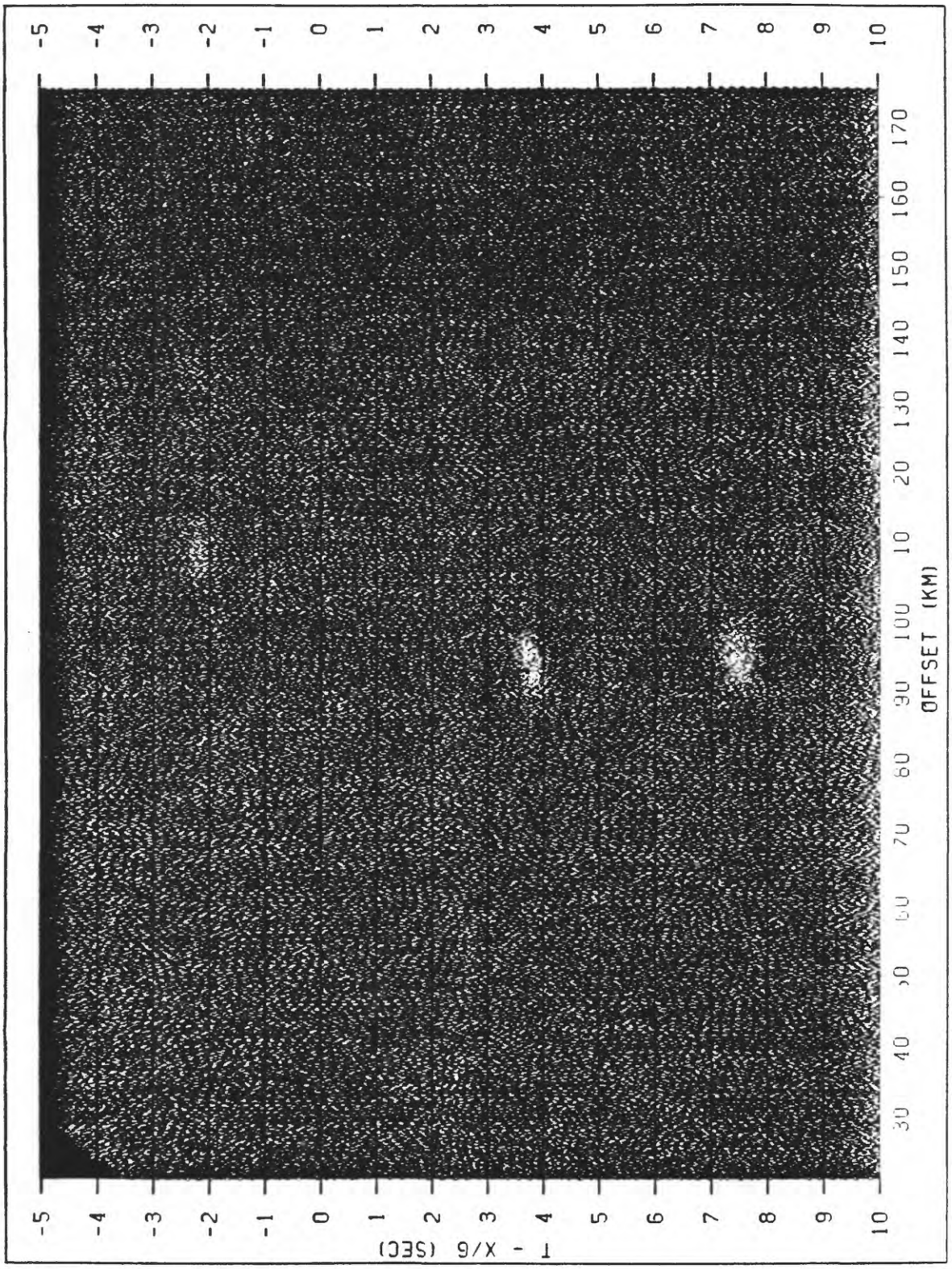


FIG. A-095. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 095
LINE 02 - GATHER 09 / STATION 7009

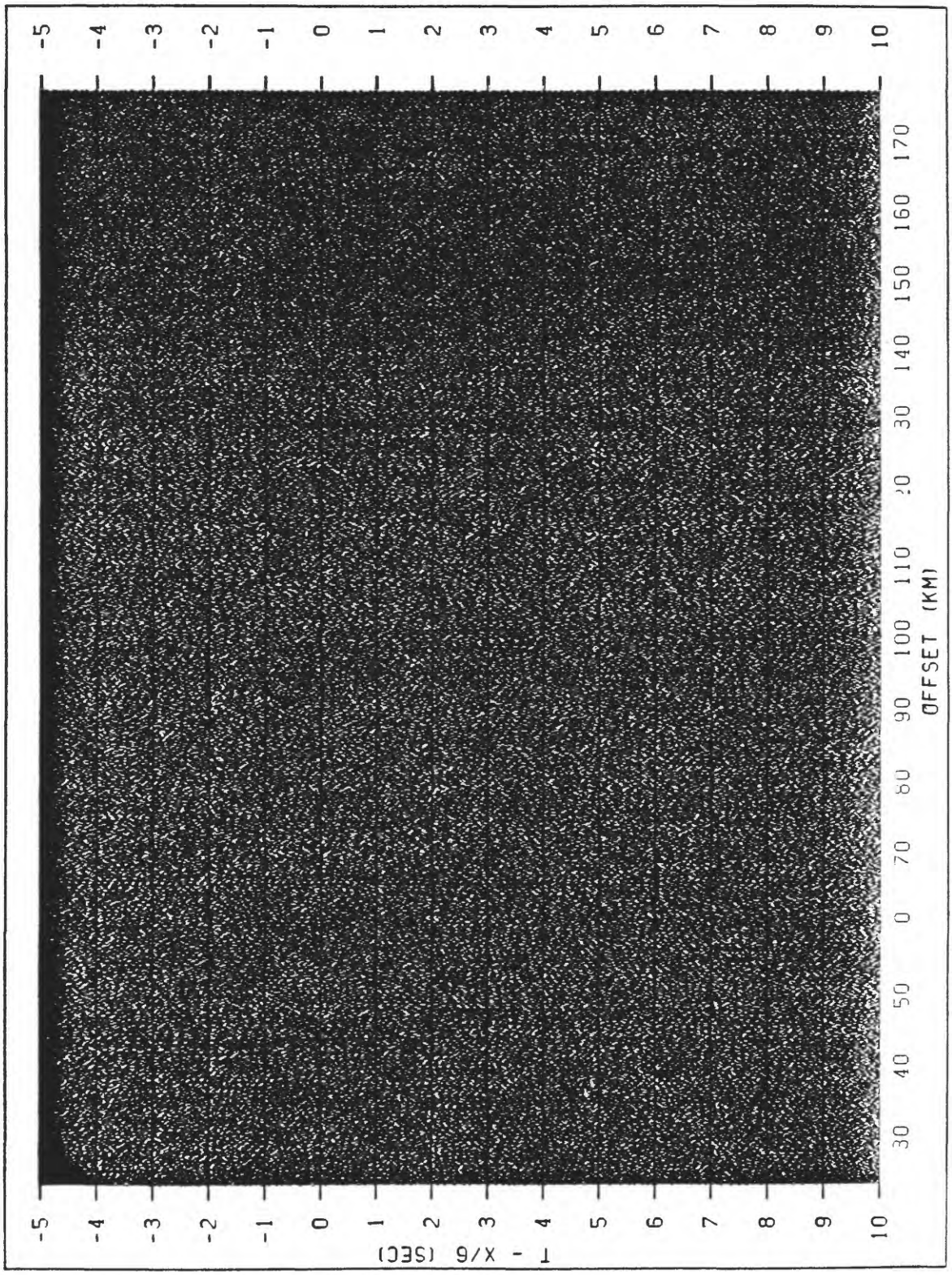


FIG. A-096. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 096
LINE 02 - GATHER 10 / STATION 7010

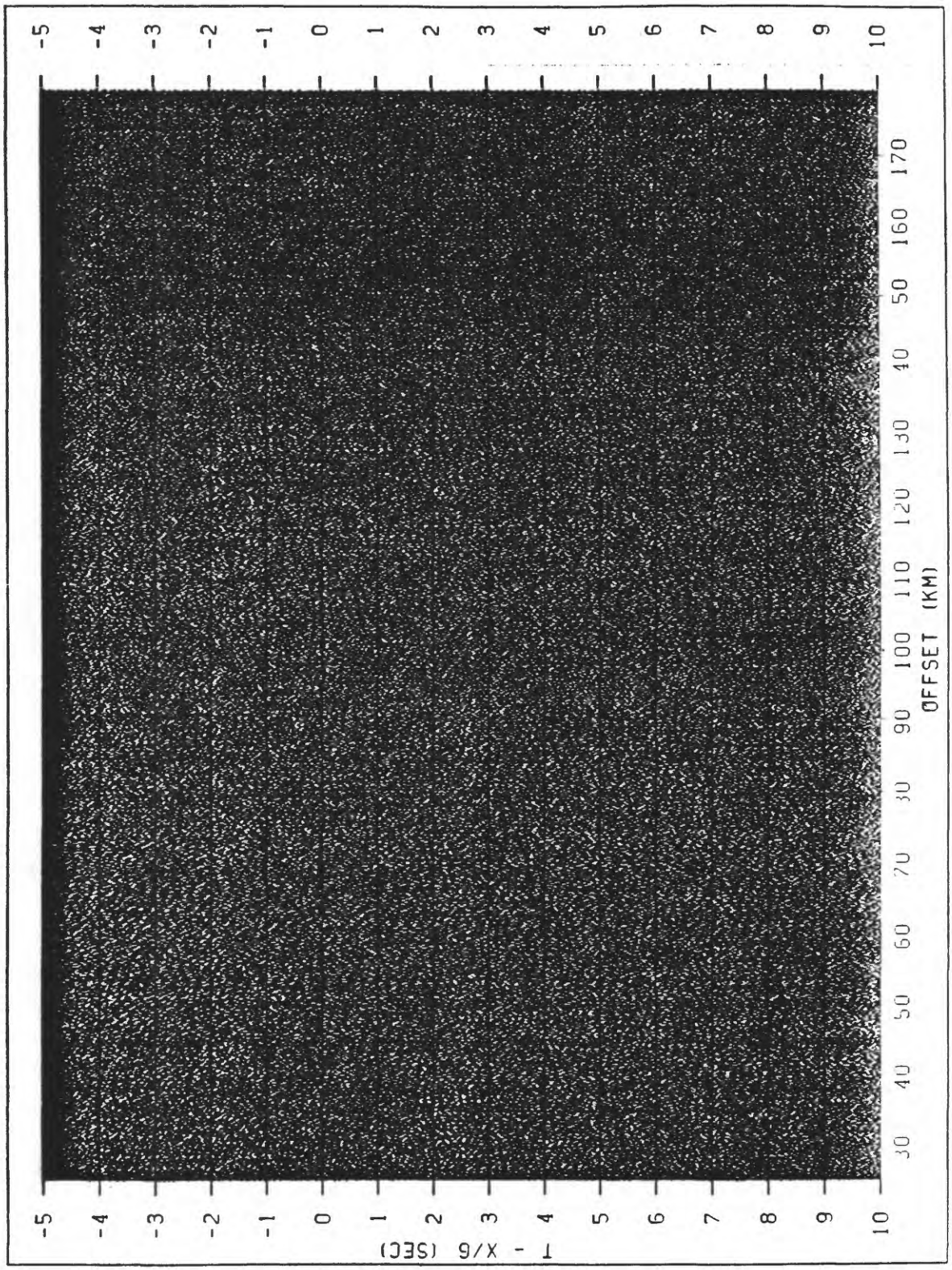


FIG. A-097. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 097
LINE 02 - GATHER 11 / STATION 7011

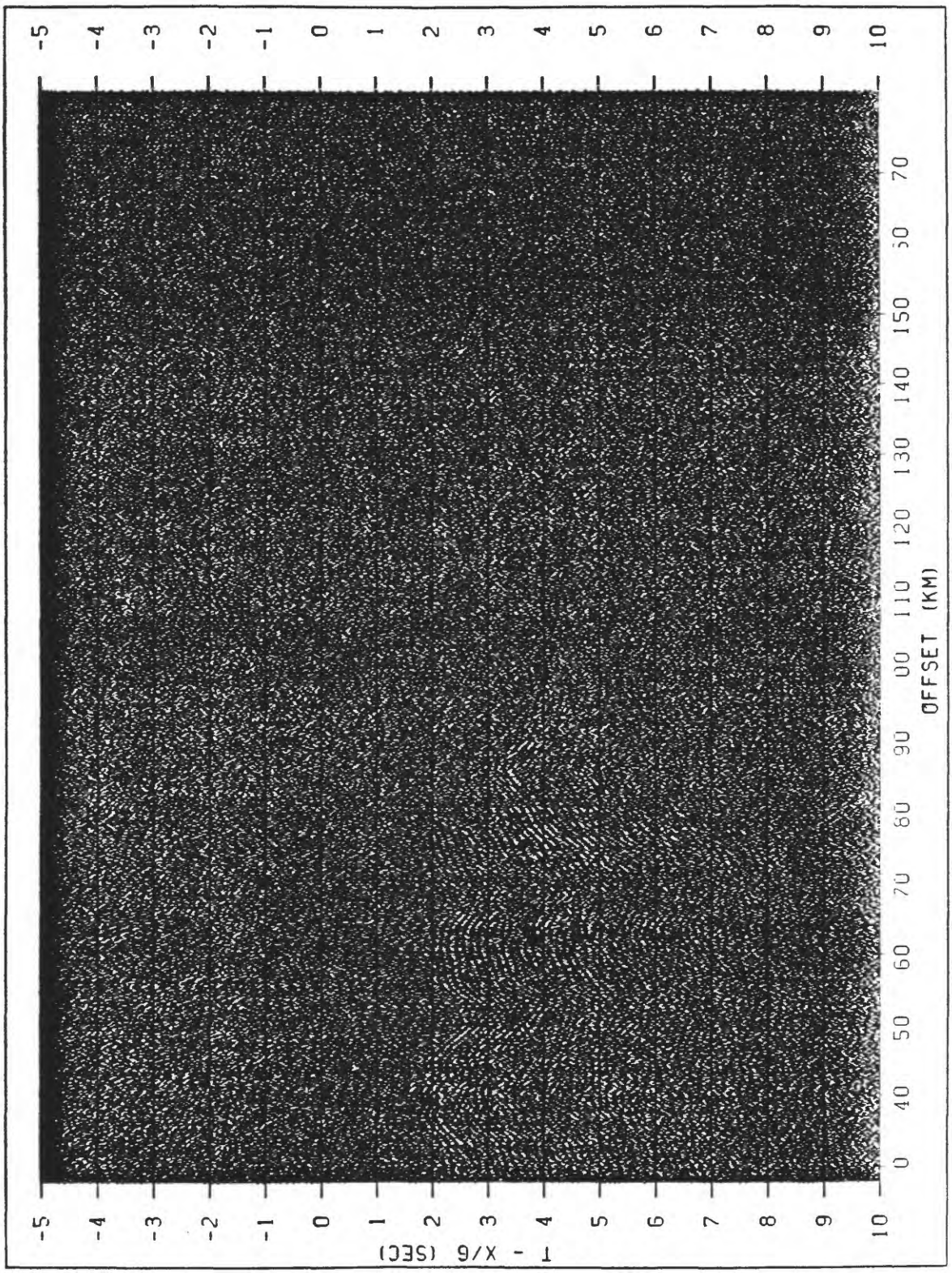


FIG. A-098. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 098
LINE 02 - GATHER 12 / STATION 7012

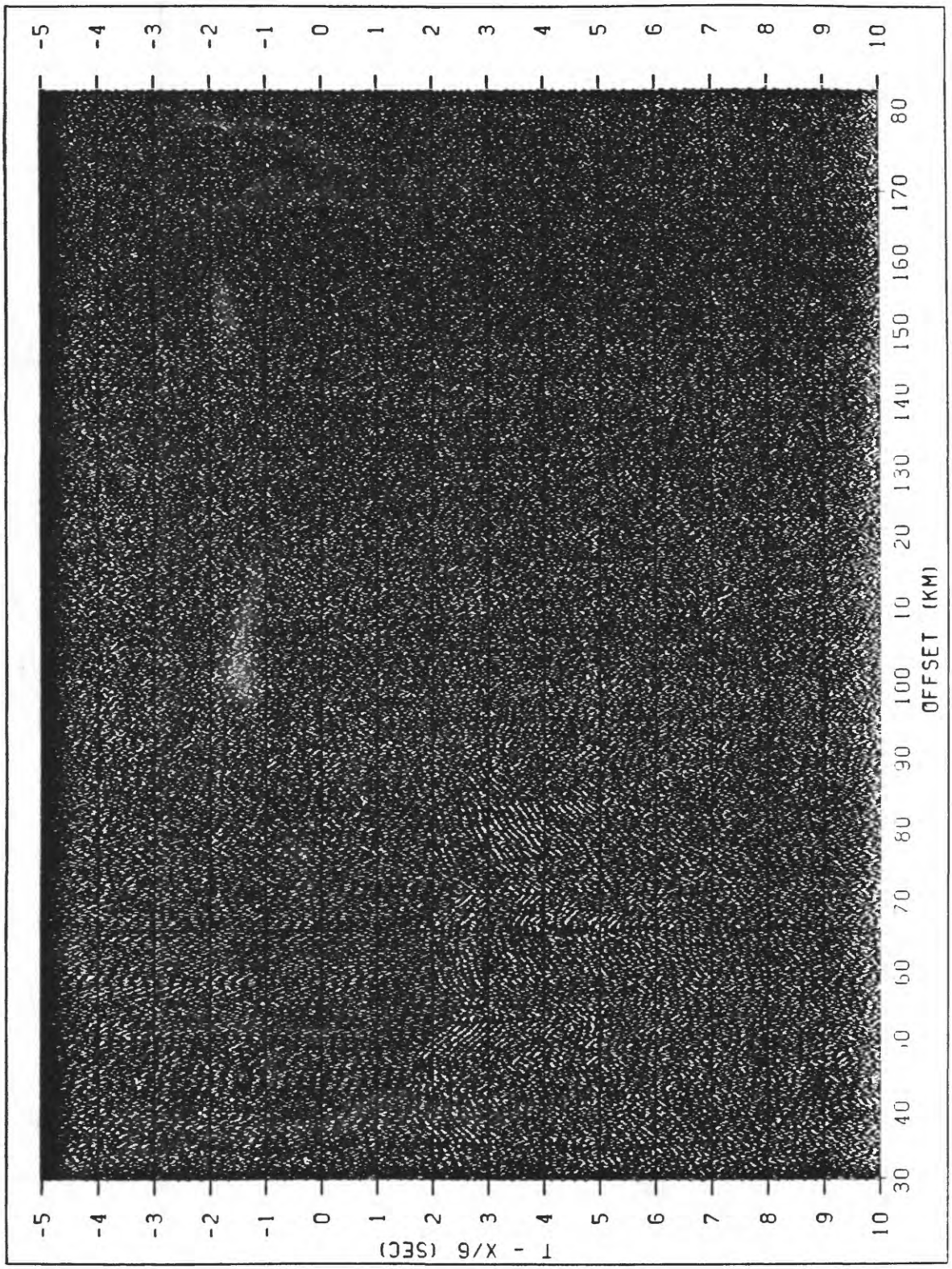


FIG. A-099. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 099
LINE 02 - GATHER 13 / STATION 7013

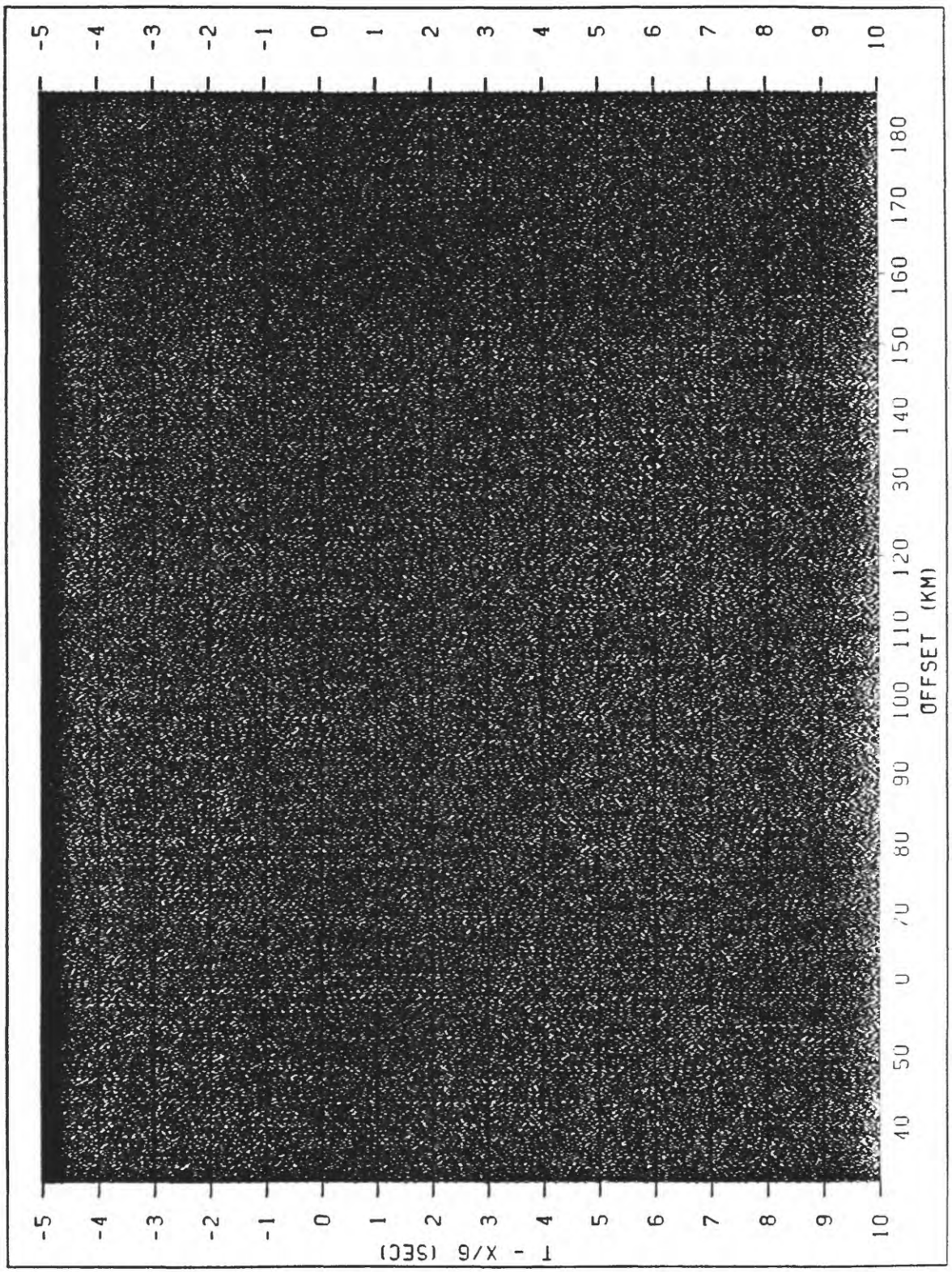


FIG. A-100. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 100
LINE 02 - GATHER 14 / STATION 7014

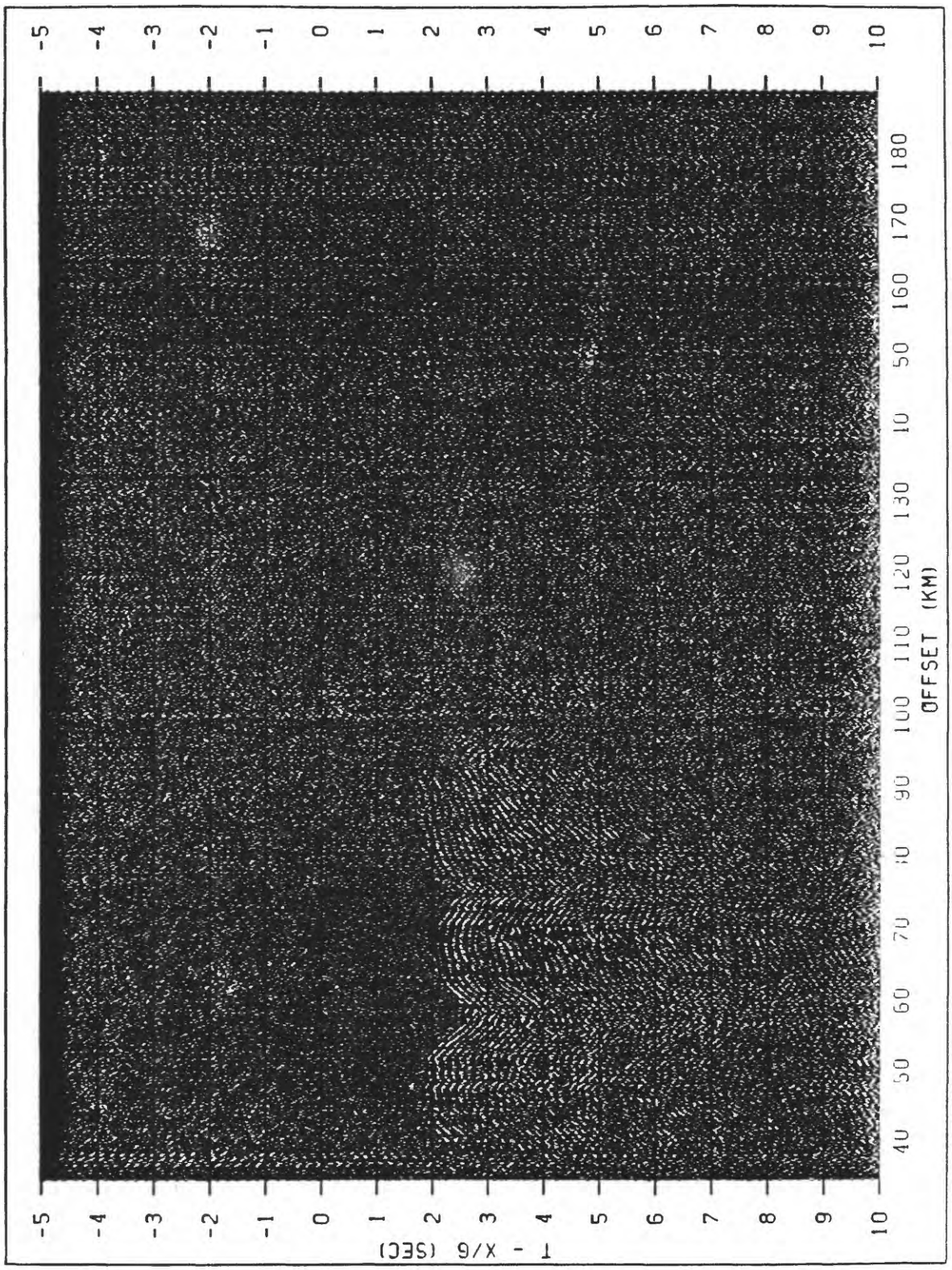


FIG. A-101. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 101
LINE 02 - GATHER 15 / STATION 7015

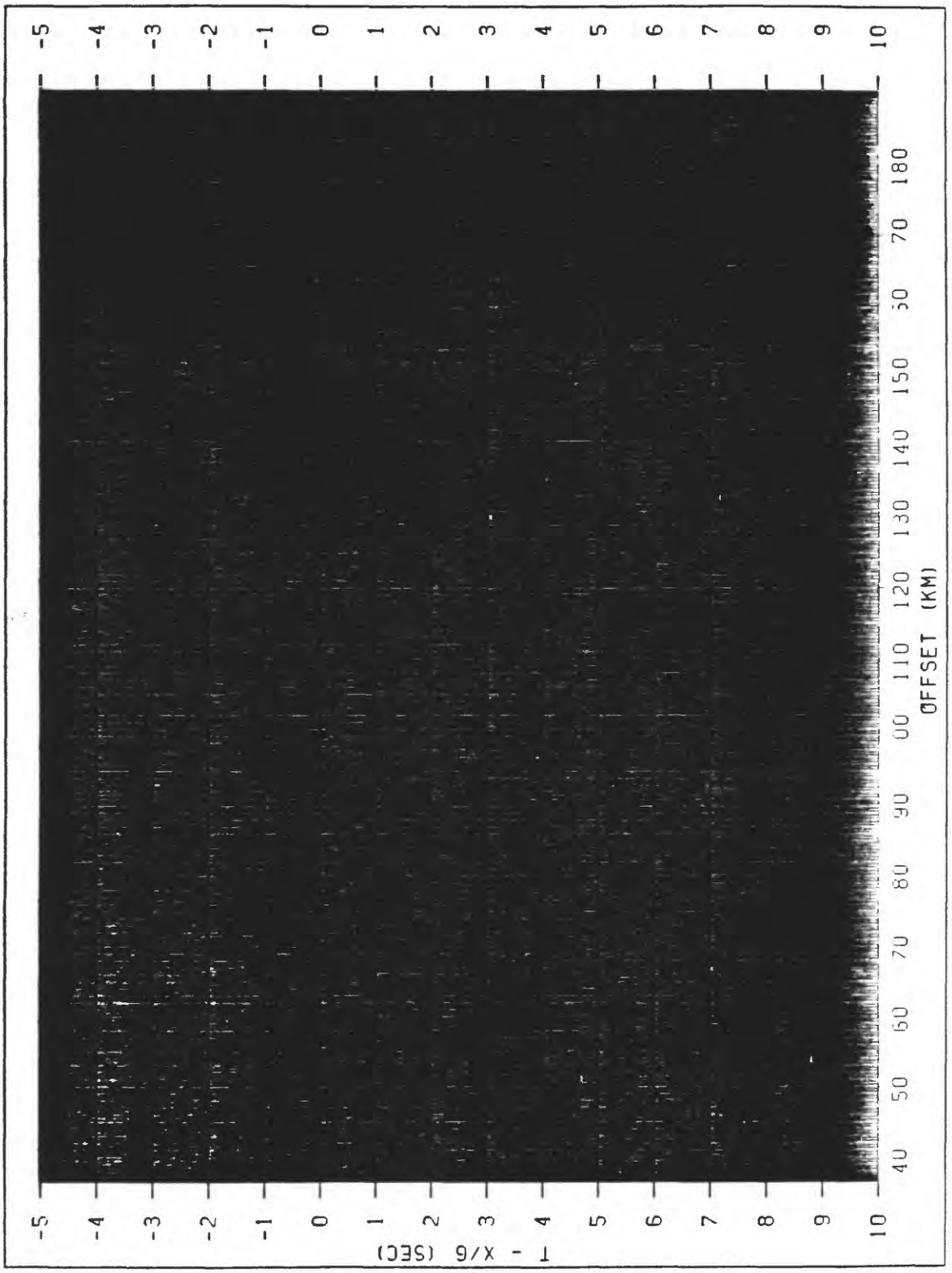


FIG. A-102. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 102
LINE 02 - GATHER 16 / STATION 7016

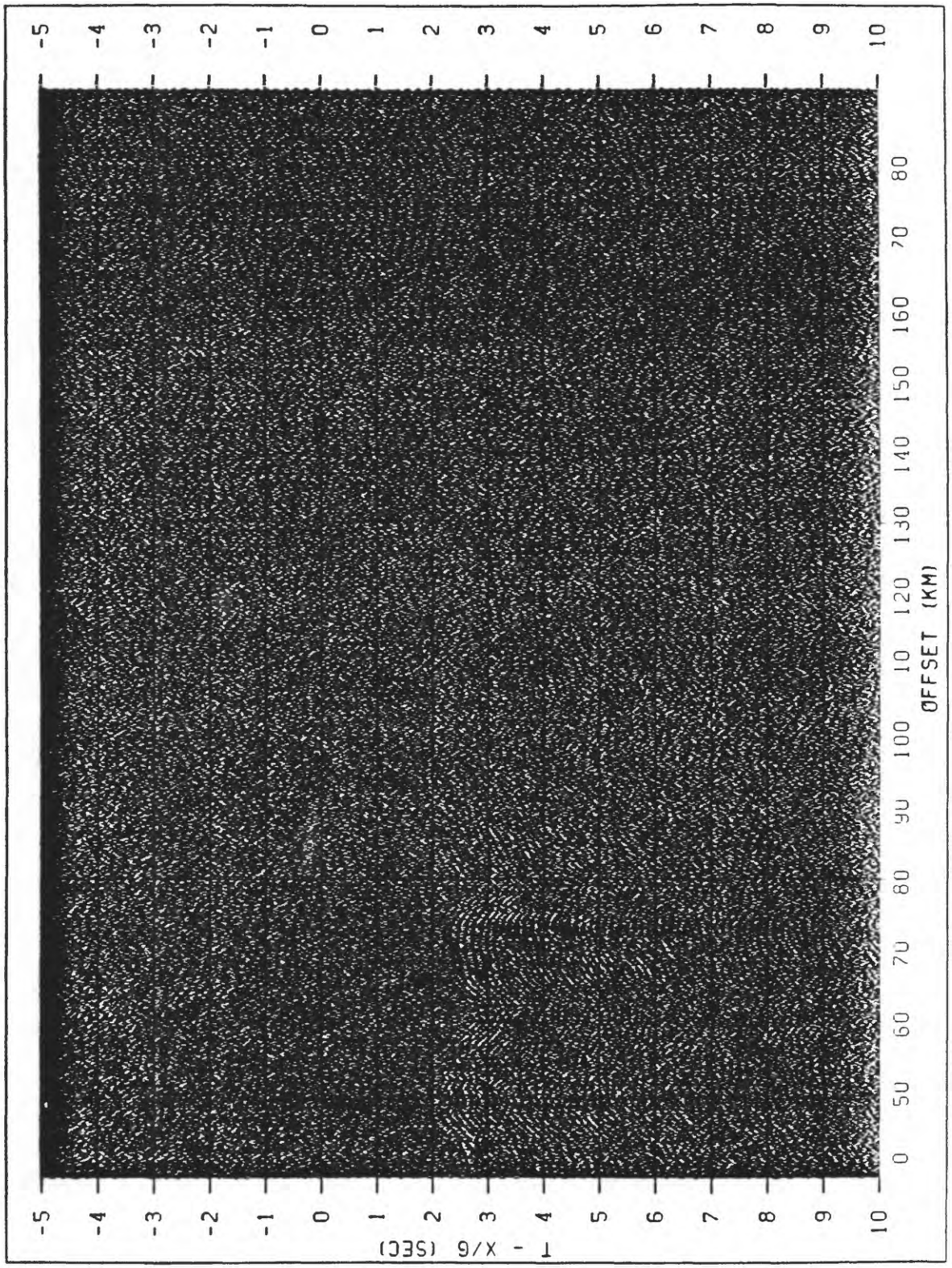


FIG. A-103. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 103
LINE 02 - GATHER 17 / STATION 7017

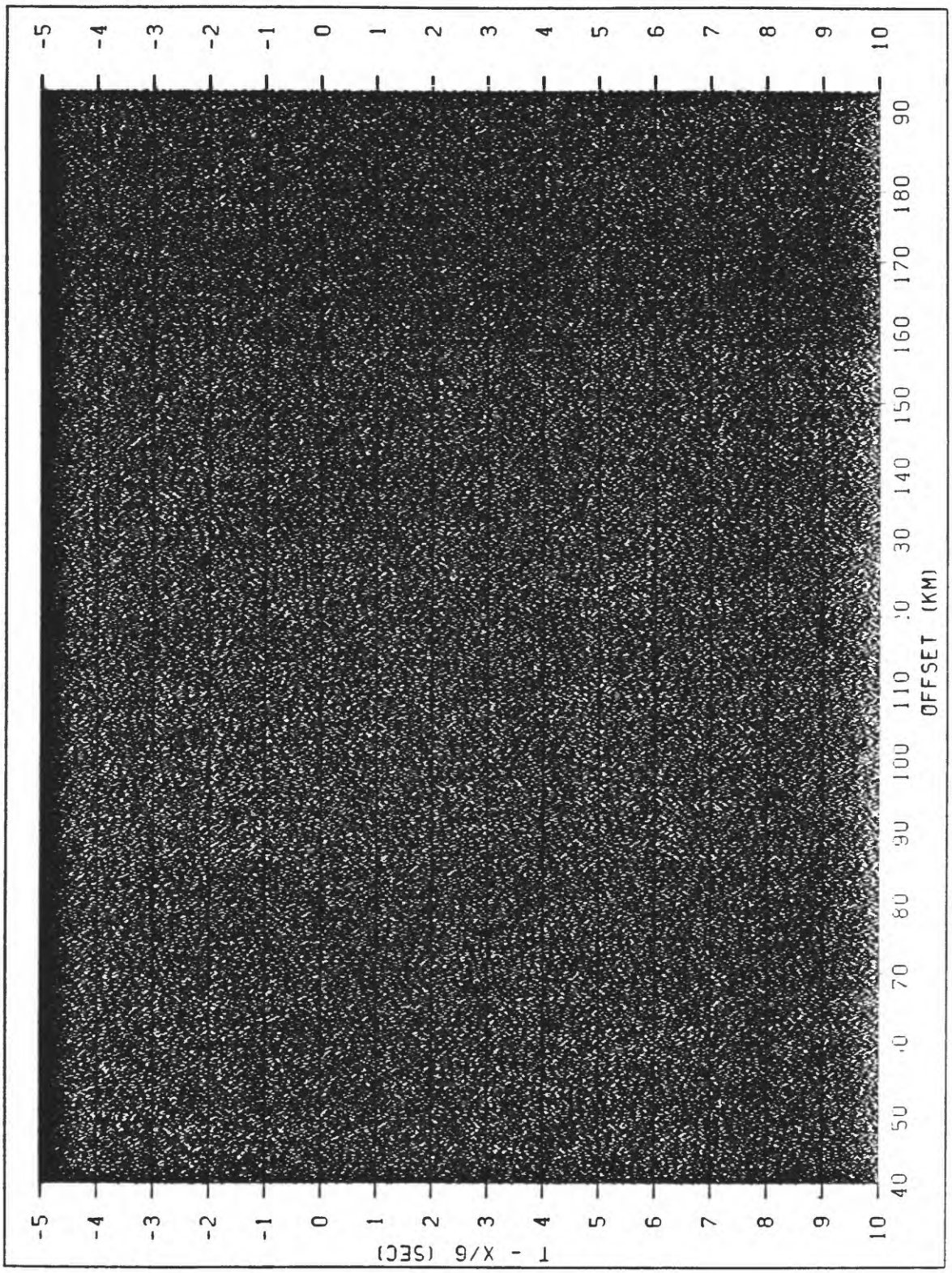


FIG. A-104. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 104
LINE 02 - GATHER 18 / STATION 7018

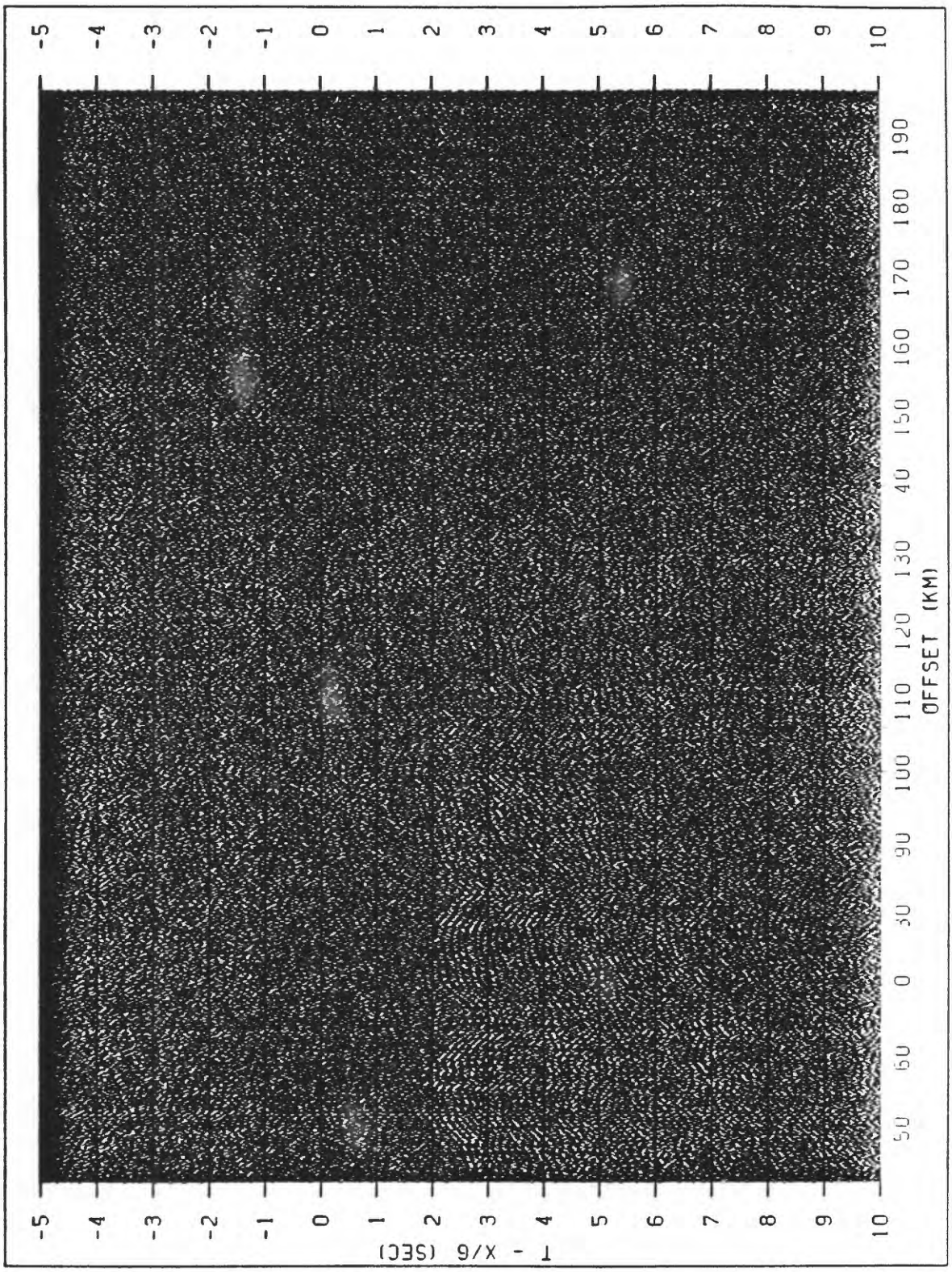


FIG. A-105. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 105
LINE 02 - GATHER 19 / STATION 7019

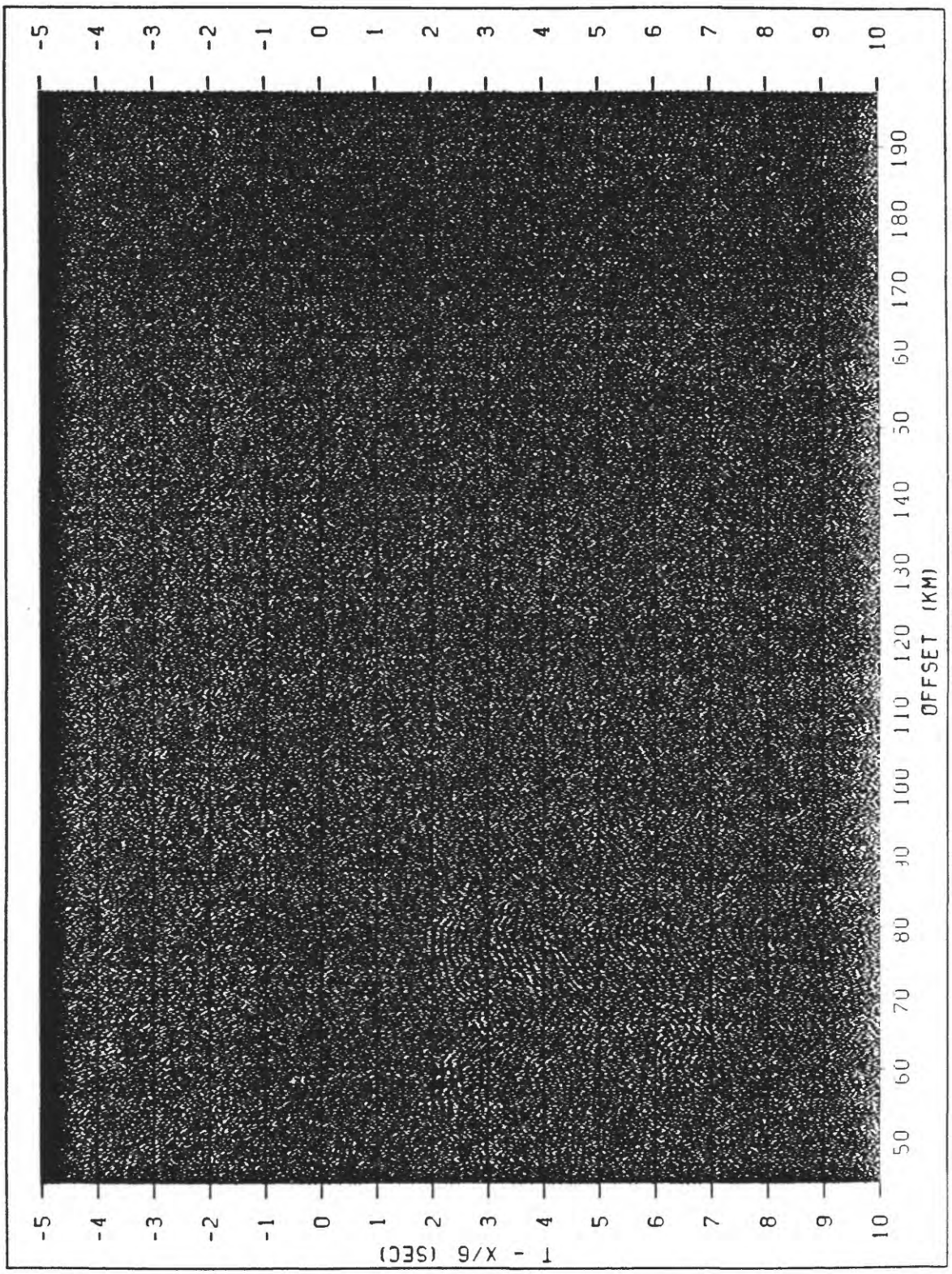


FIG. A-106. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 106
LINE 02 - GATHER 20 / STATION 7020

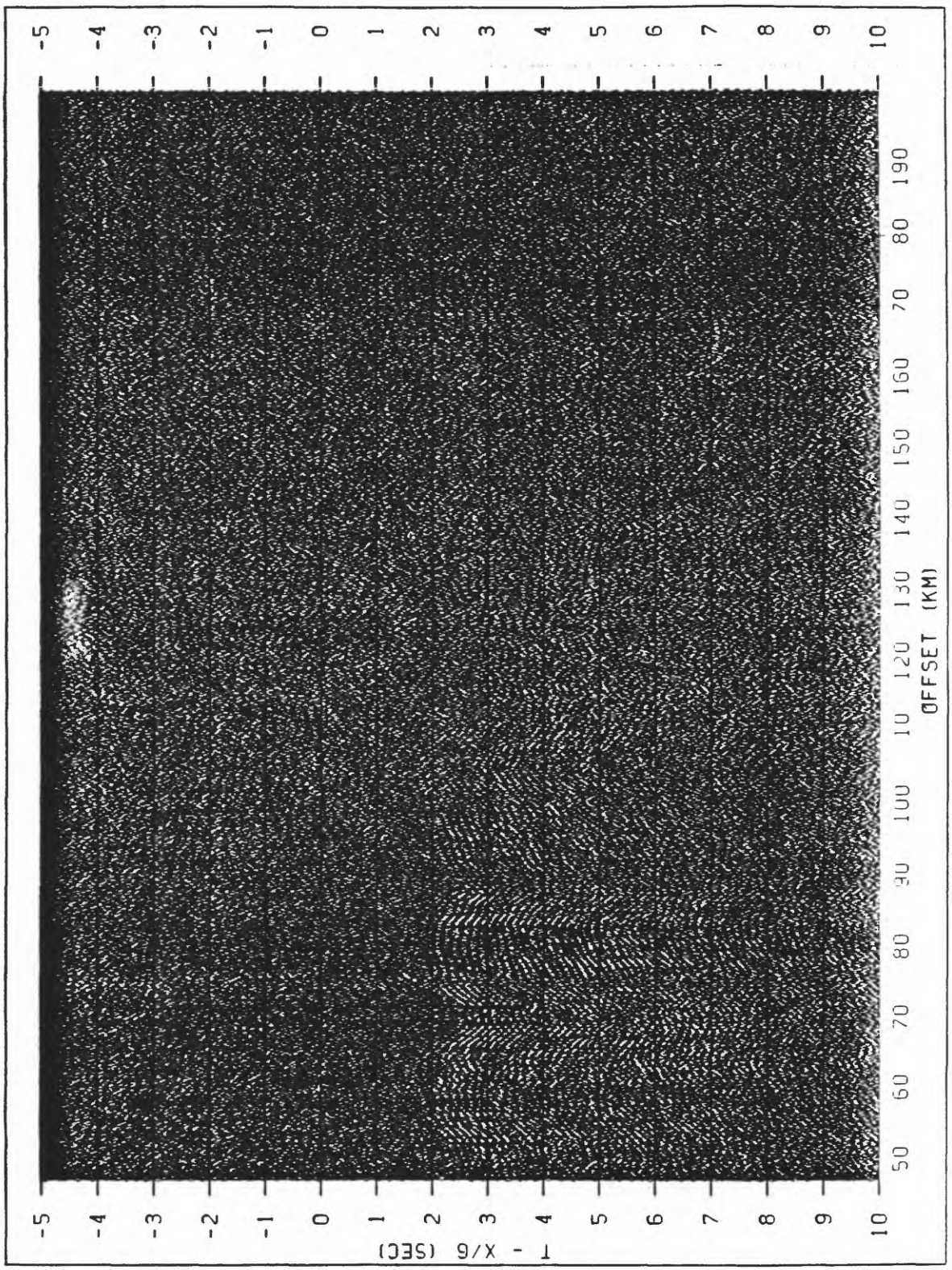


FIG. A-107. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 107
LINE 02 - GATHER 21 / STATION 7021

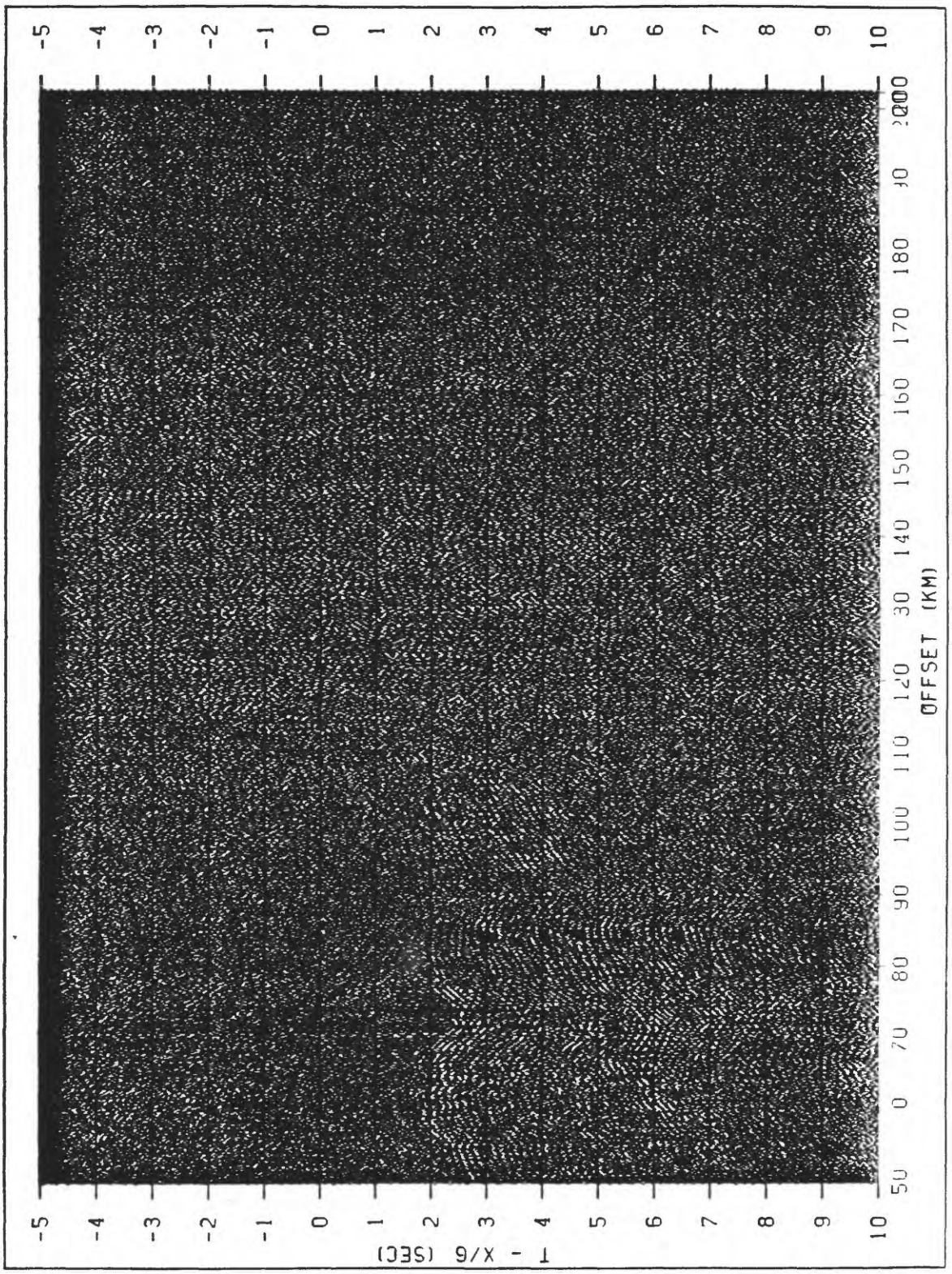


FIG. A-108. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 108
LINE 02 - GATHER 22 / STATION 7022

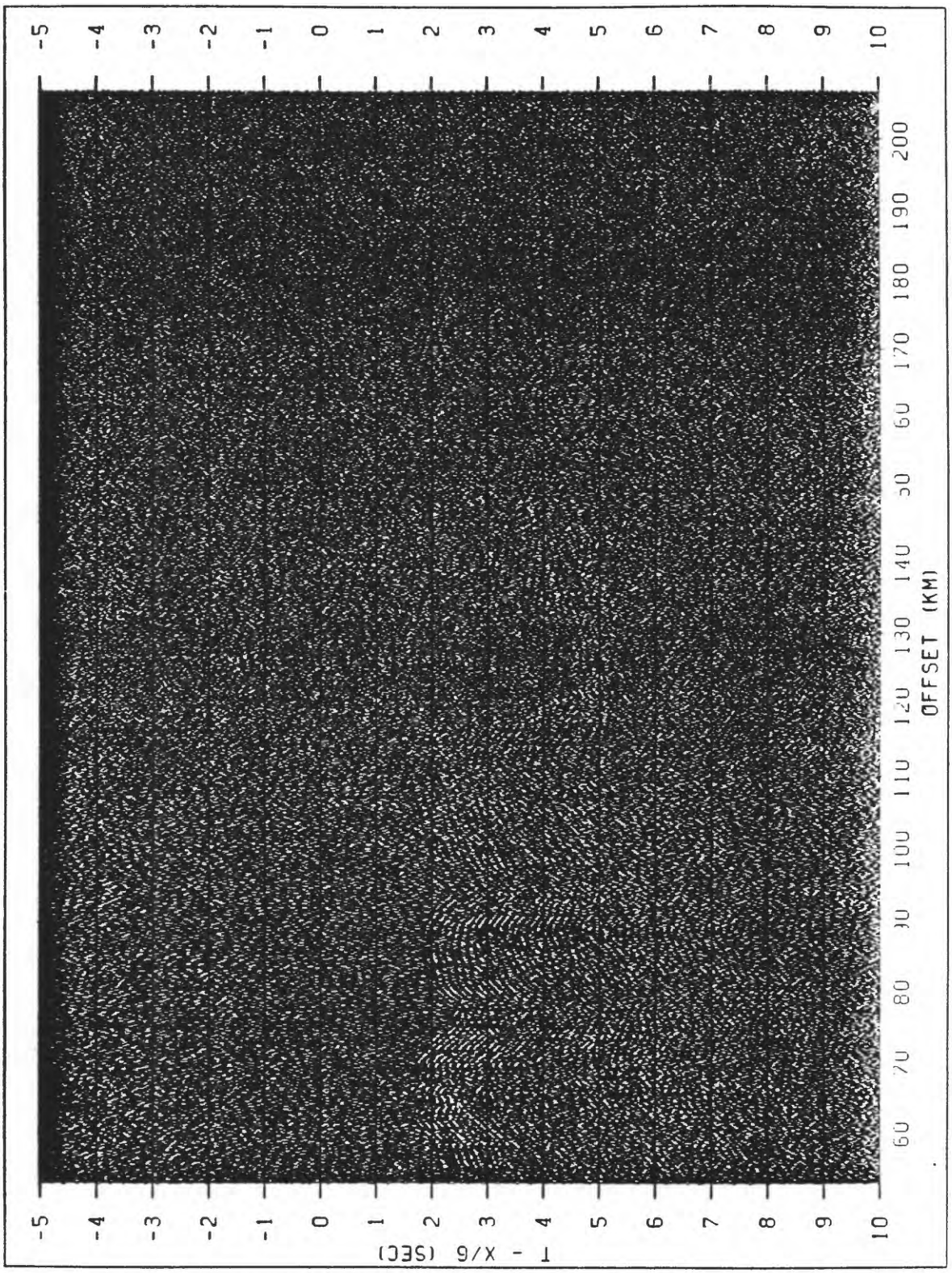


FIG. A-109. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 109
LINE 02 - GATHER 23 / STATION 7023

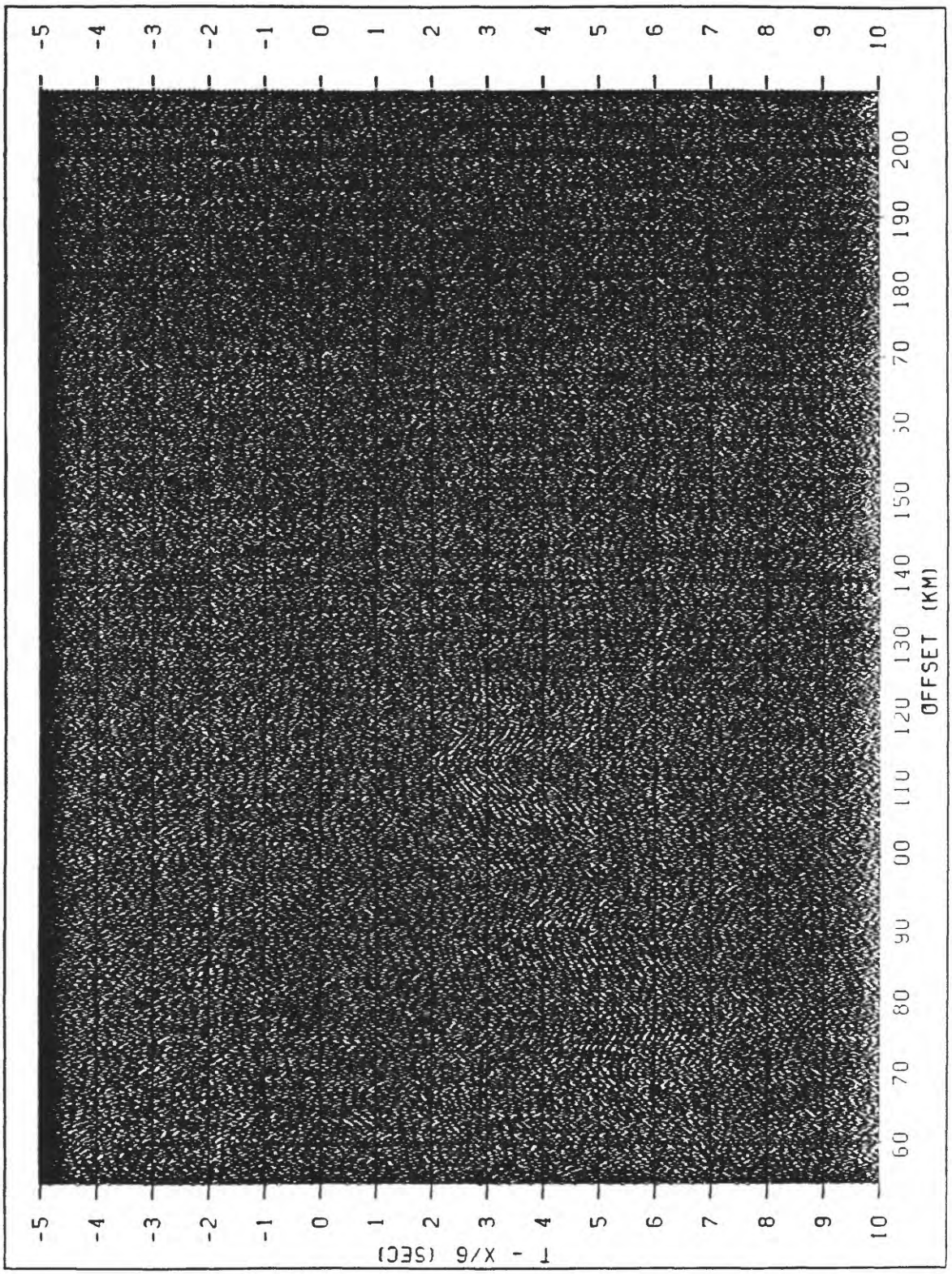


FIG. A-110. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 110
LINE 02 - GATHER 24 / STATION 7024

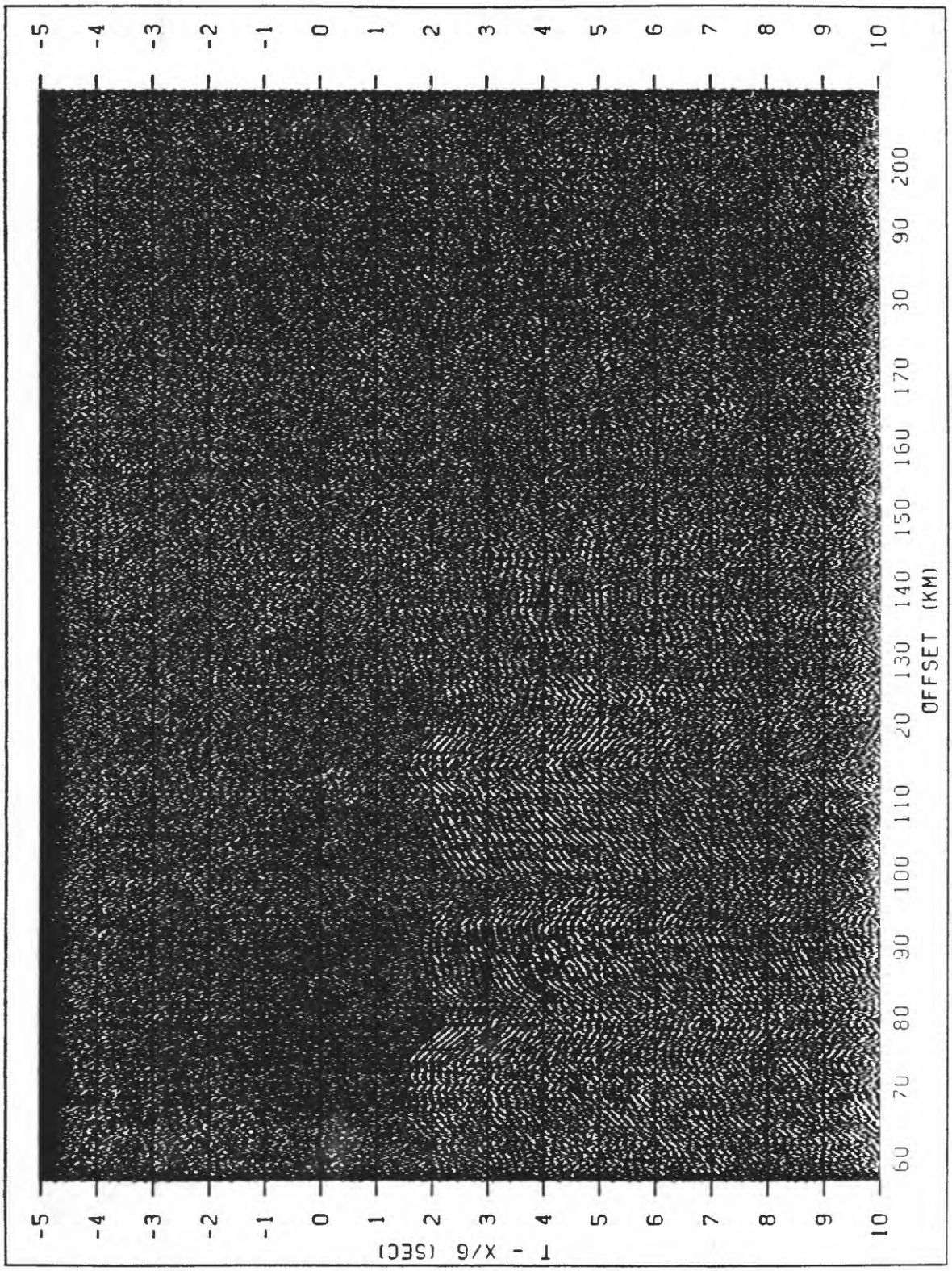


FIG. A-111. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 111
LINE 02 - GATHER 25 / STATION 7025

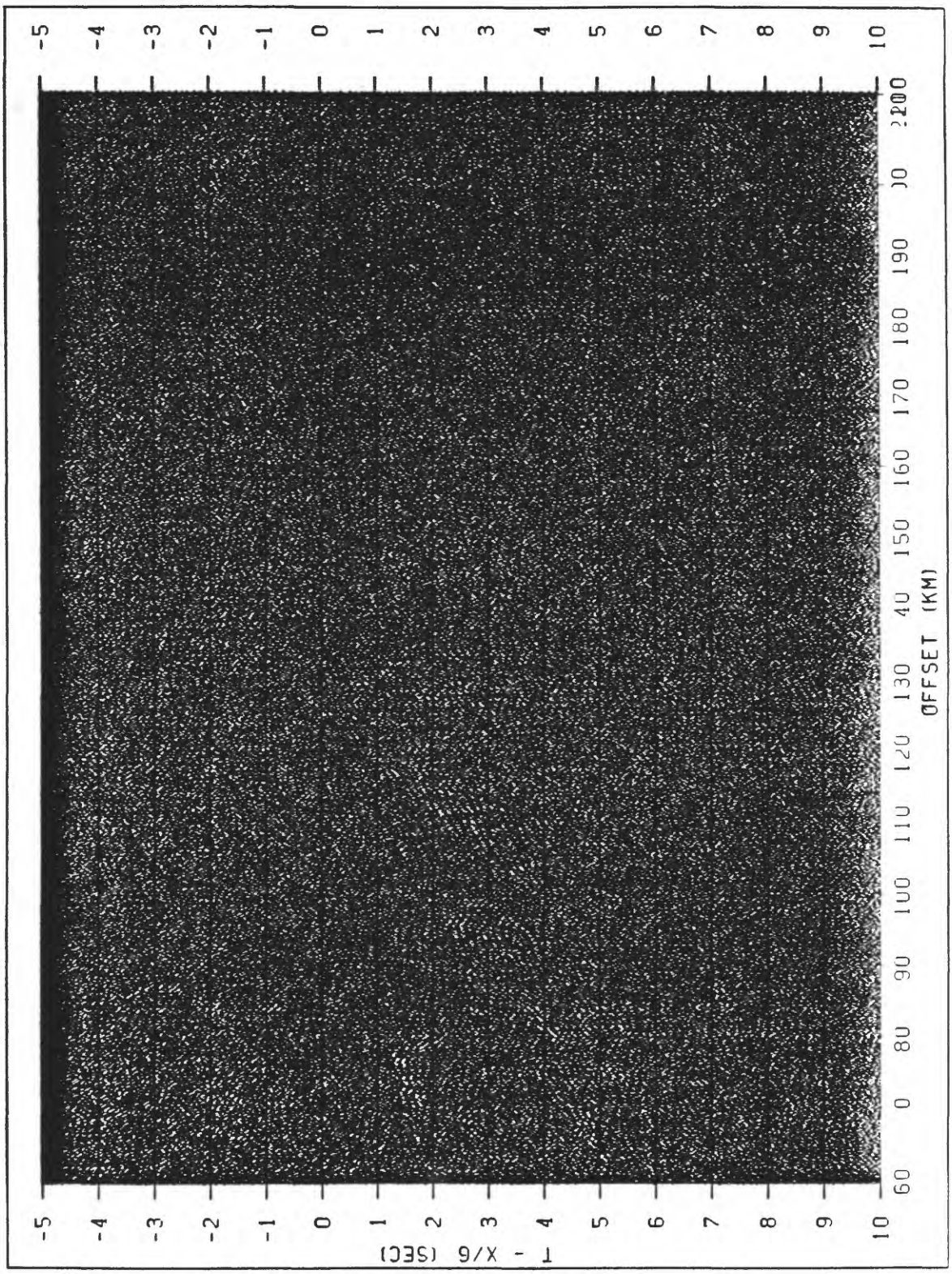


FIG. A-112. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 112
LINE 02 - GATHER 26 / STATION 7026

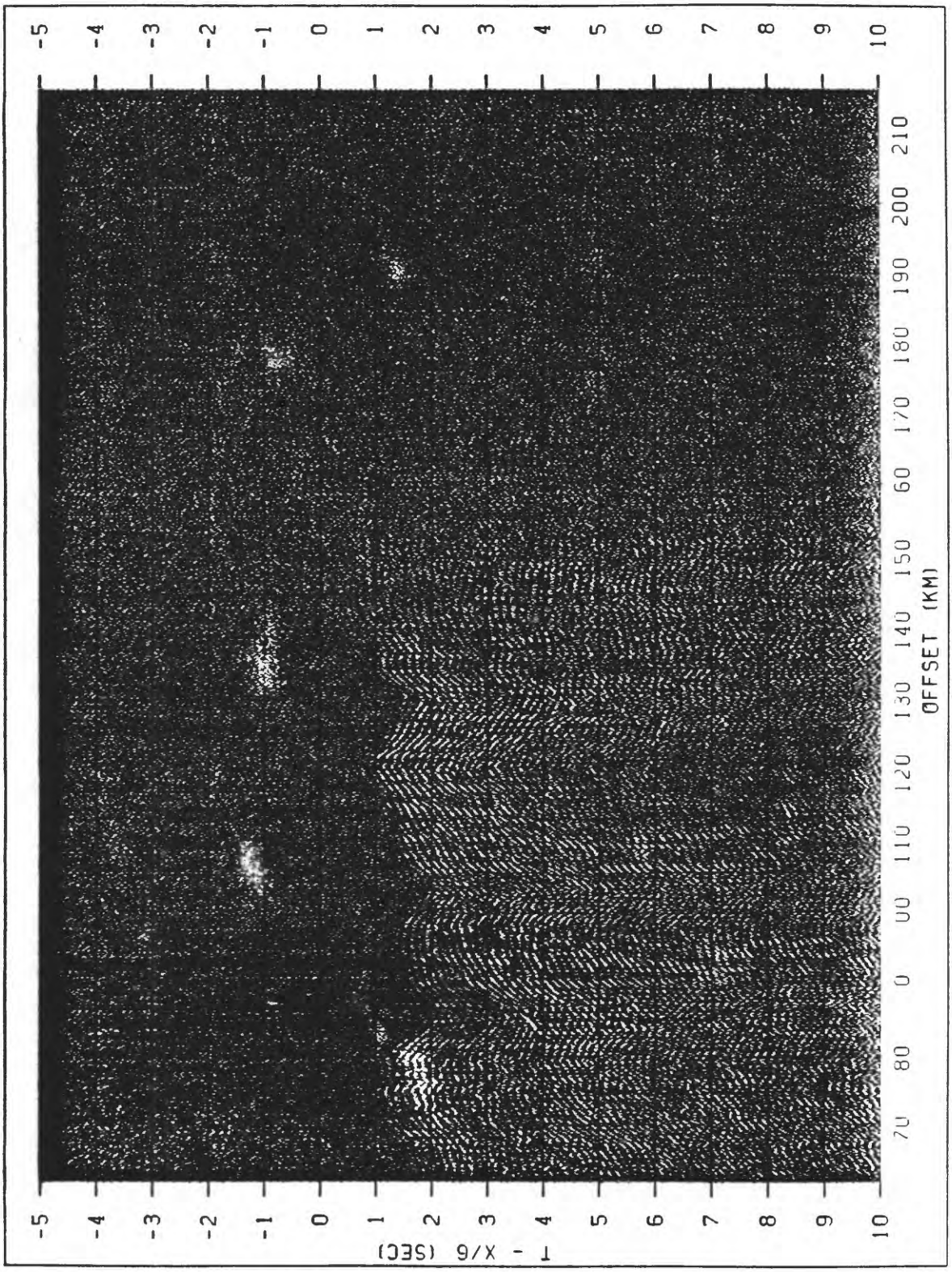


FIG. A-113. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 113
LINE 02 - GATHER 27 / STATION 7027

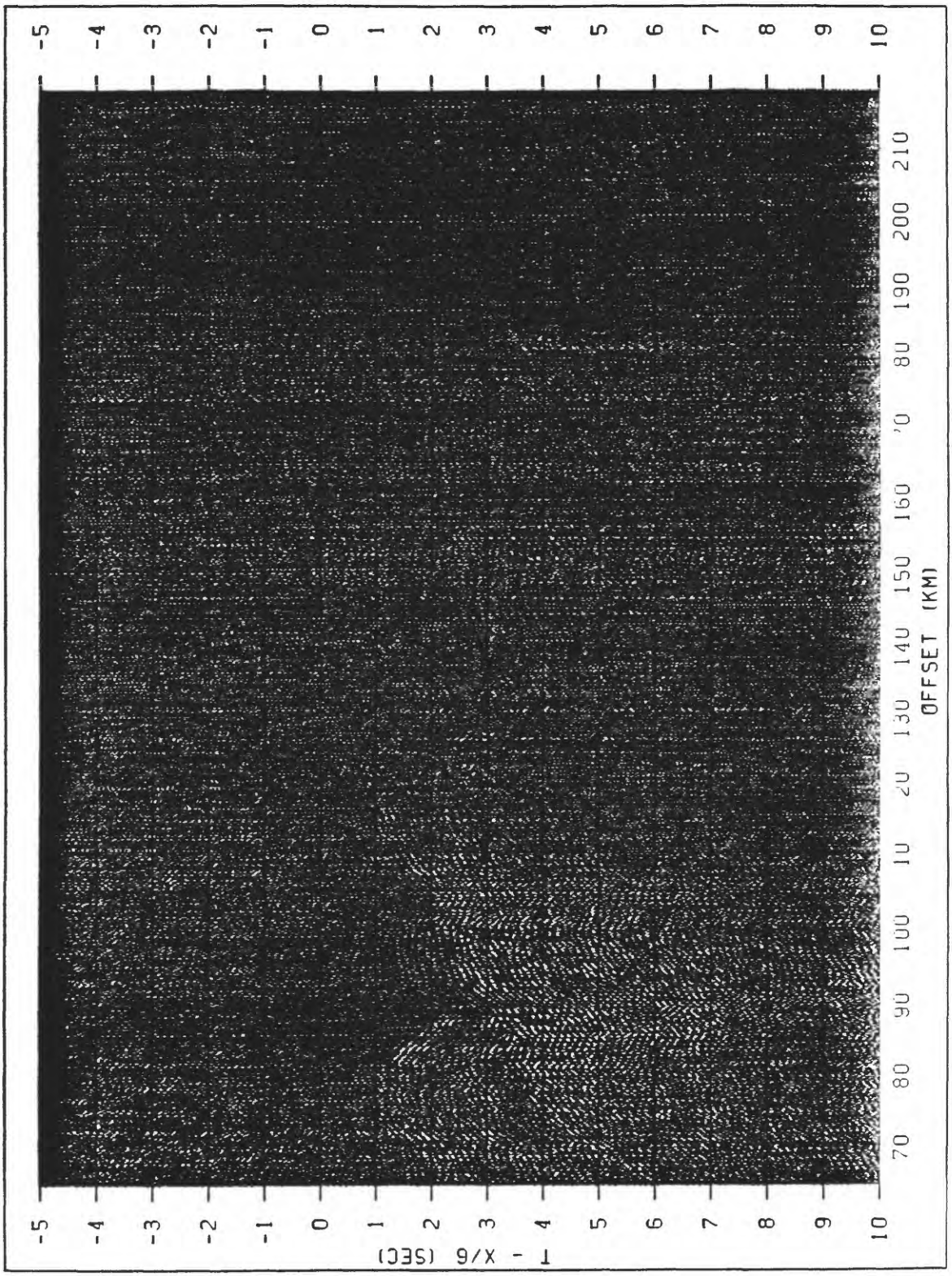


FIG. A-114. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 114
LINE 02 - GATHER 28 / STATION 7028

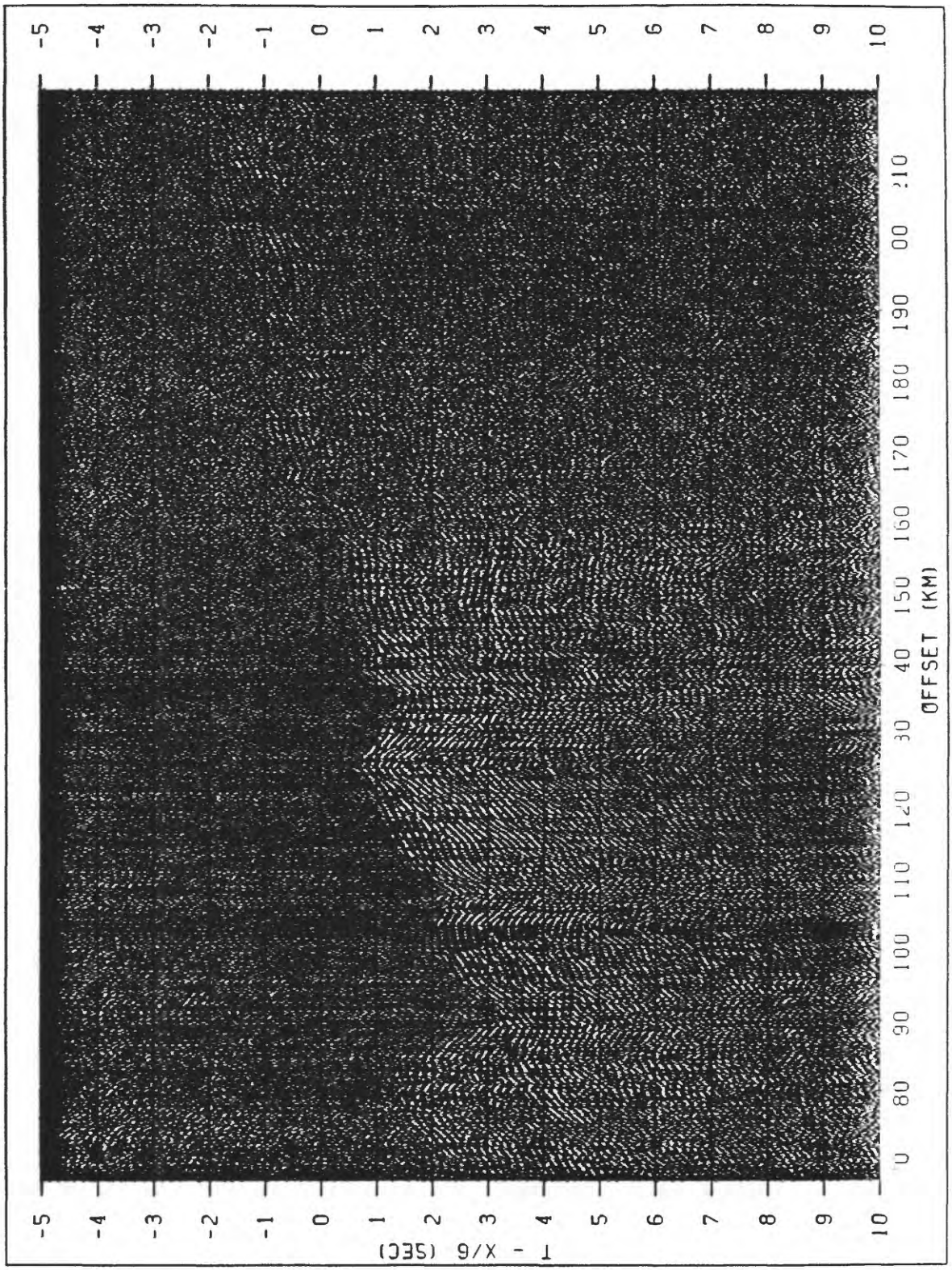


FIG. A-115. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 115
LINE 02 - GATHER 29 / STATION 7029

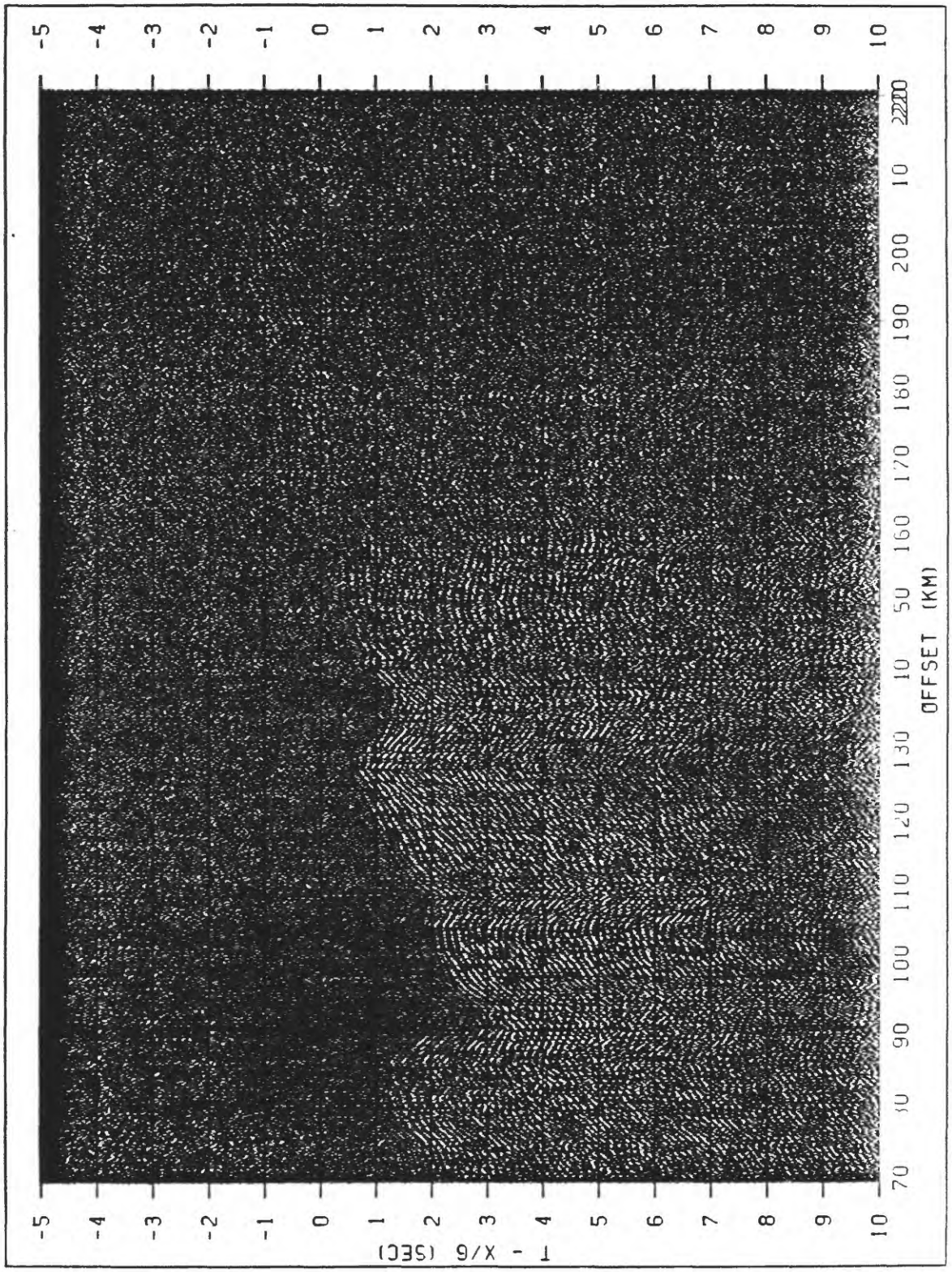


FIG. A-116. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 116
LINE 02 - GATHER 30 / STATION 7030

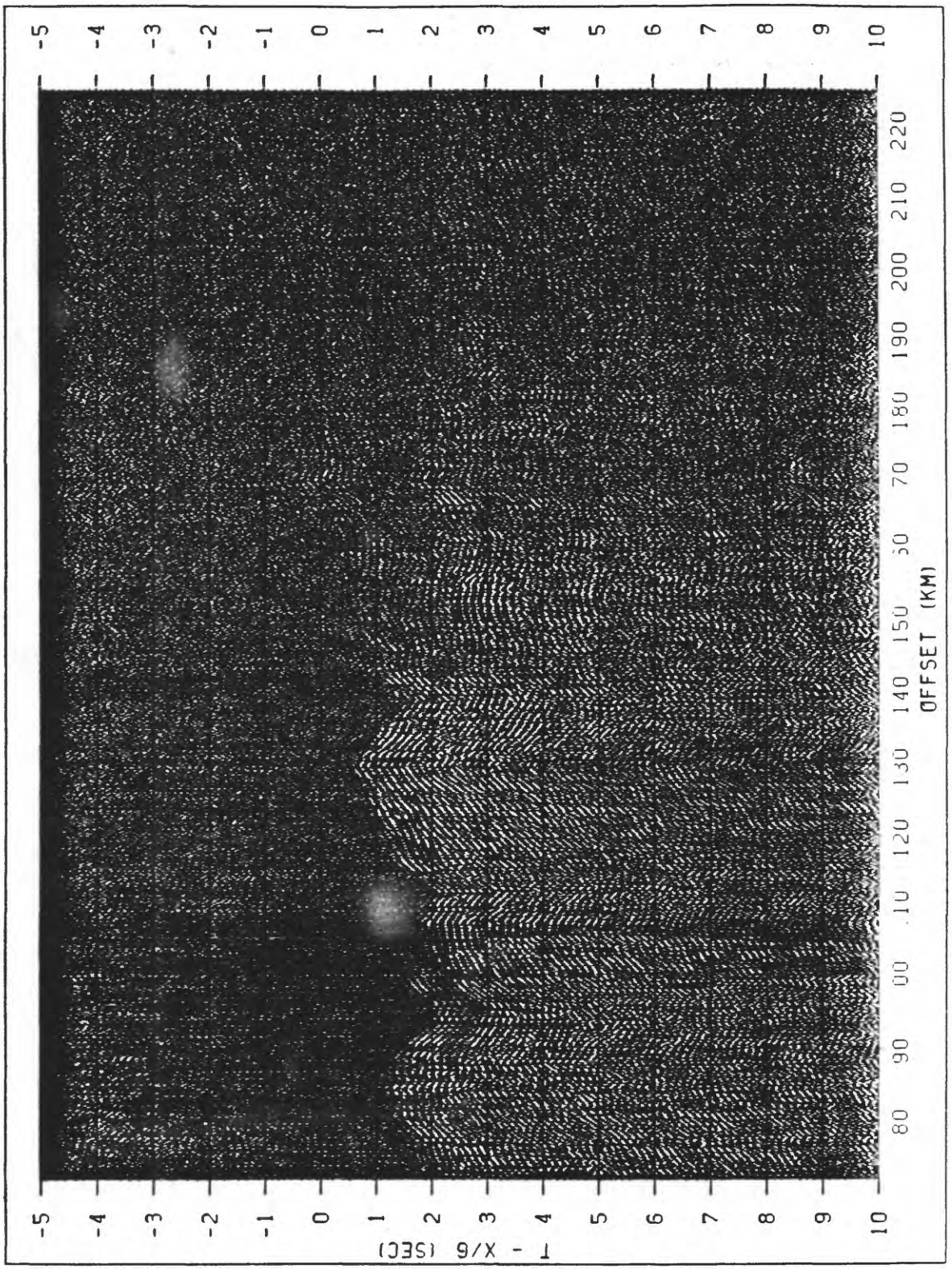


FIG. A-117. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 117
LINE 02 - GATHER 31 / STATION 7031

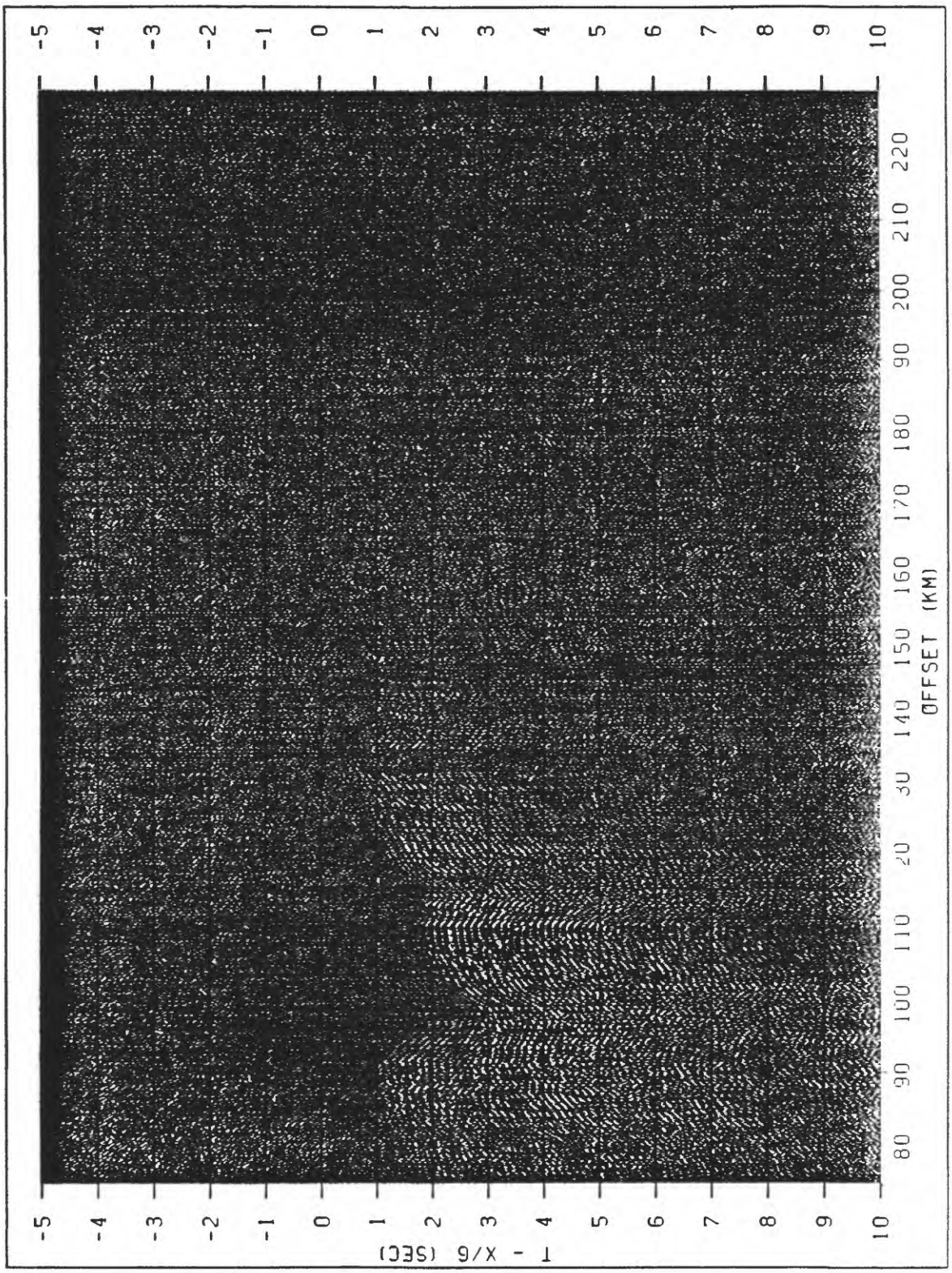


FIG. A-118. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 118
LINE 02 - GATHER 32 / STATION 7032

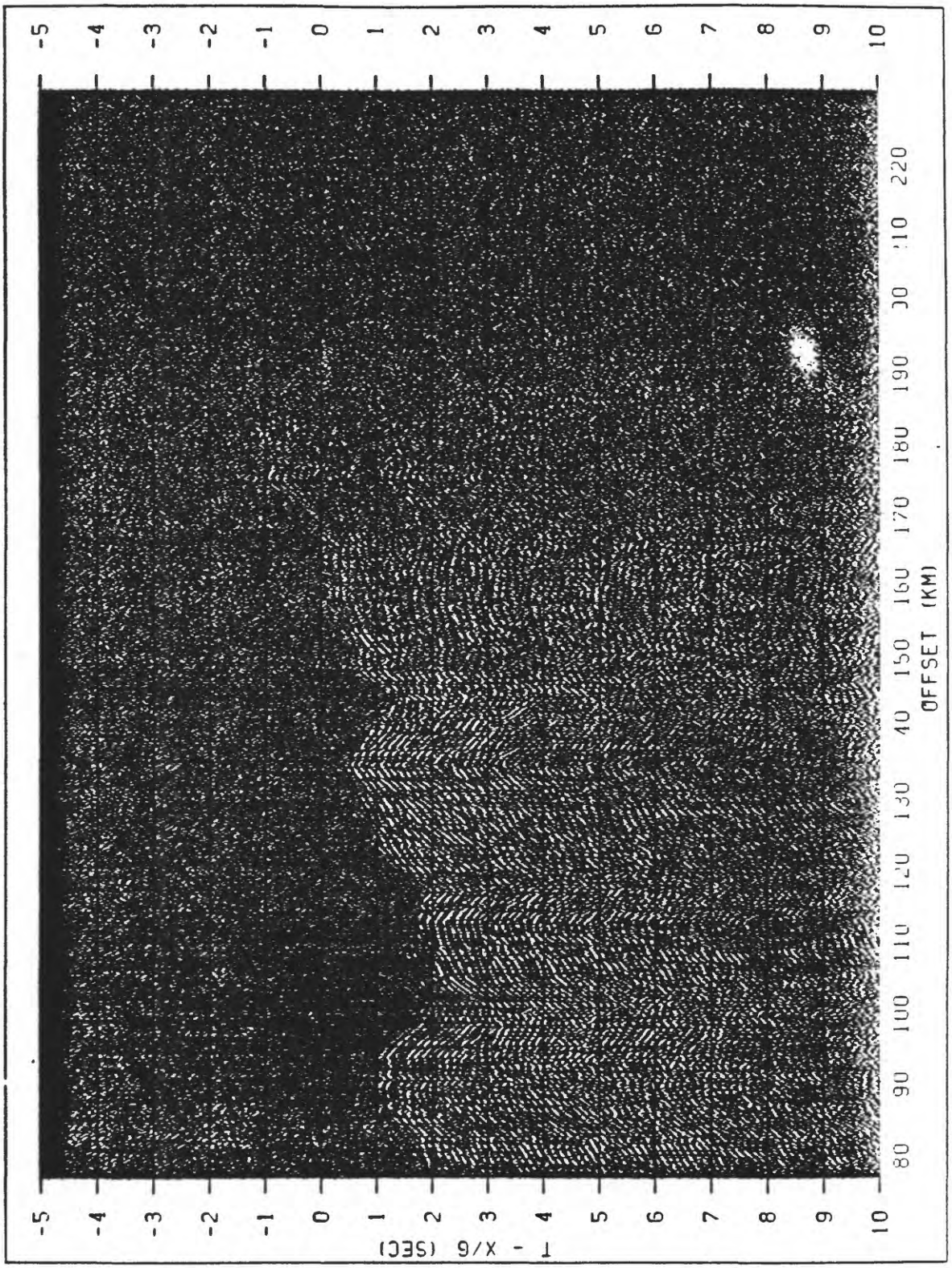


FIG. A-119. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 119
LINE 02 - GATHER 33 / STATION 7033

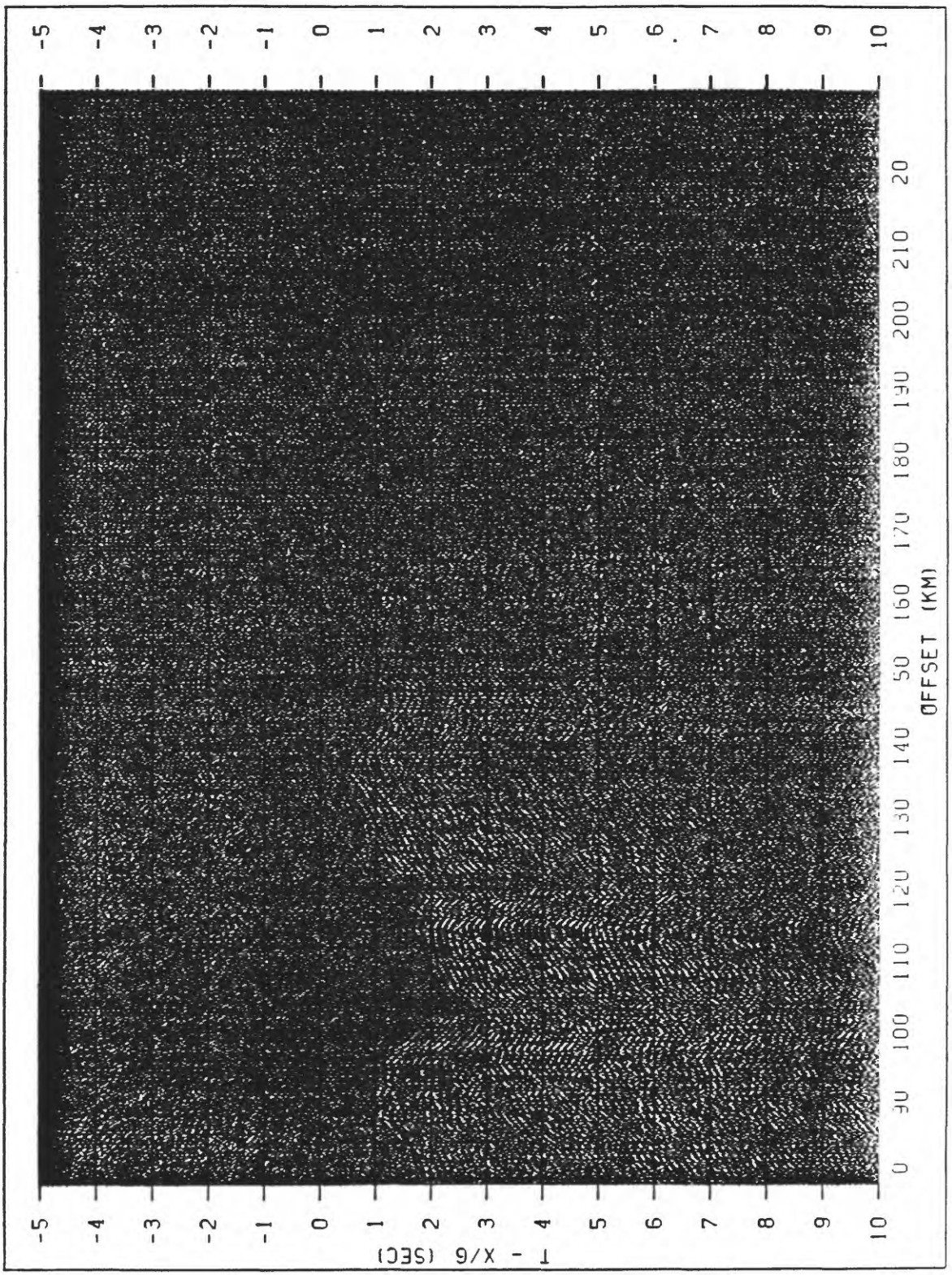


FIG. A-120. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 120
LINE 02 - GATHER 34 / STATION 7034

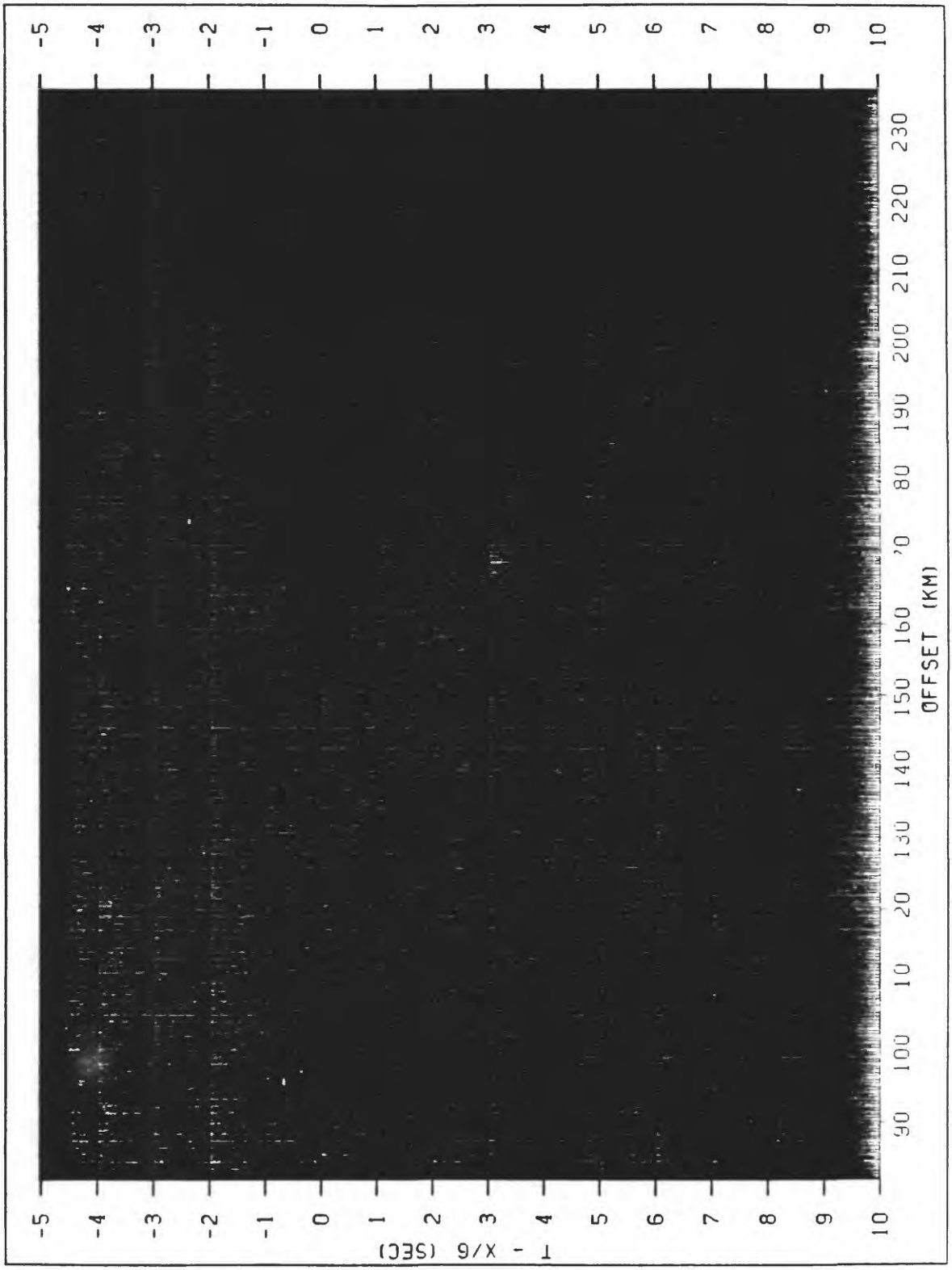


FIG. A-121. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 121
LINE 02 - GATHER 35 / STATION 7035

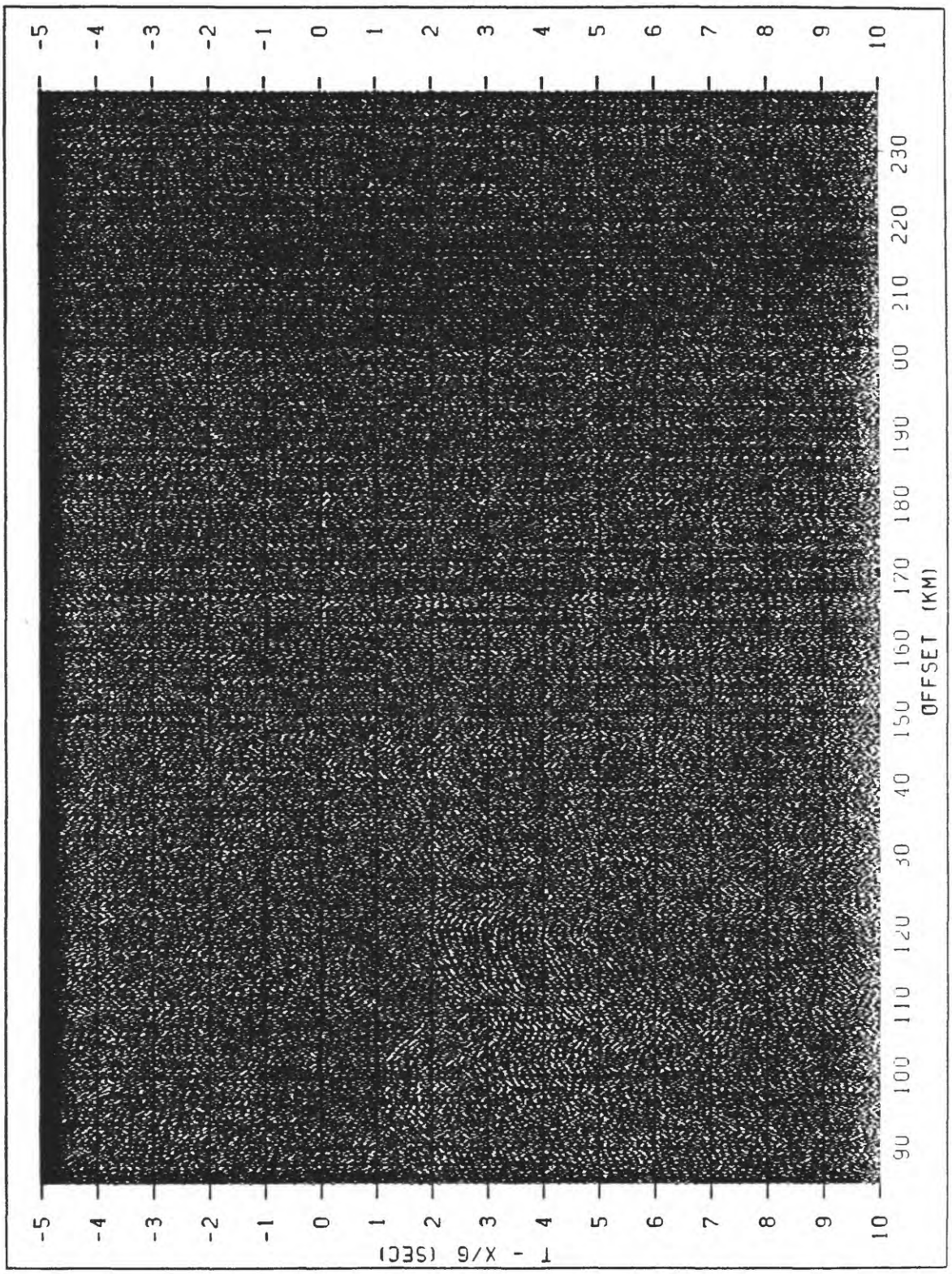


FIG. A-122. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 122
LINE 02 - GATHER 36 / STATION 7036

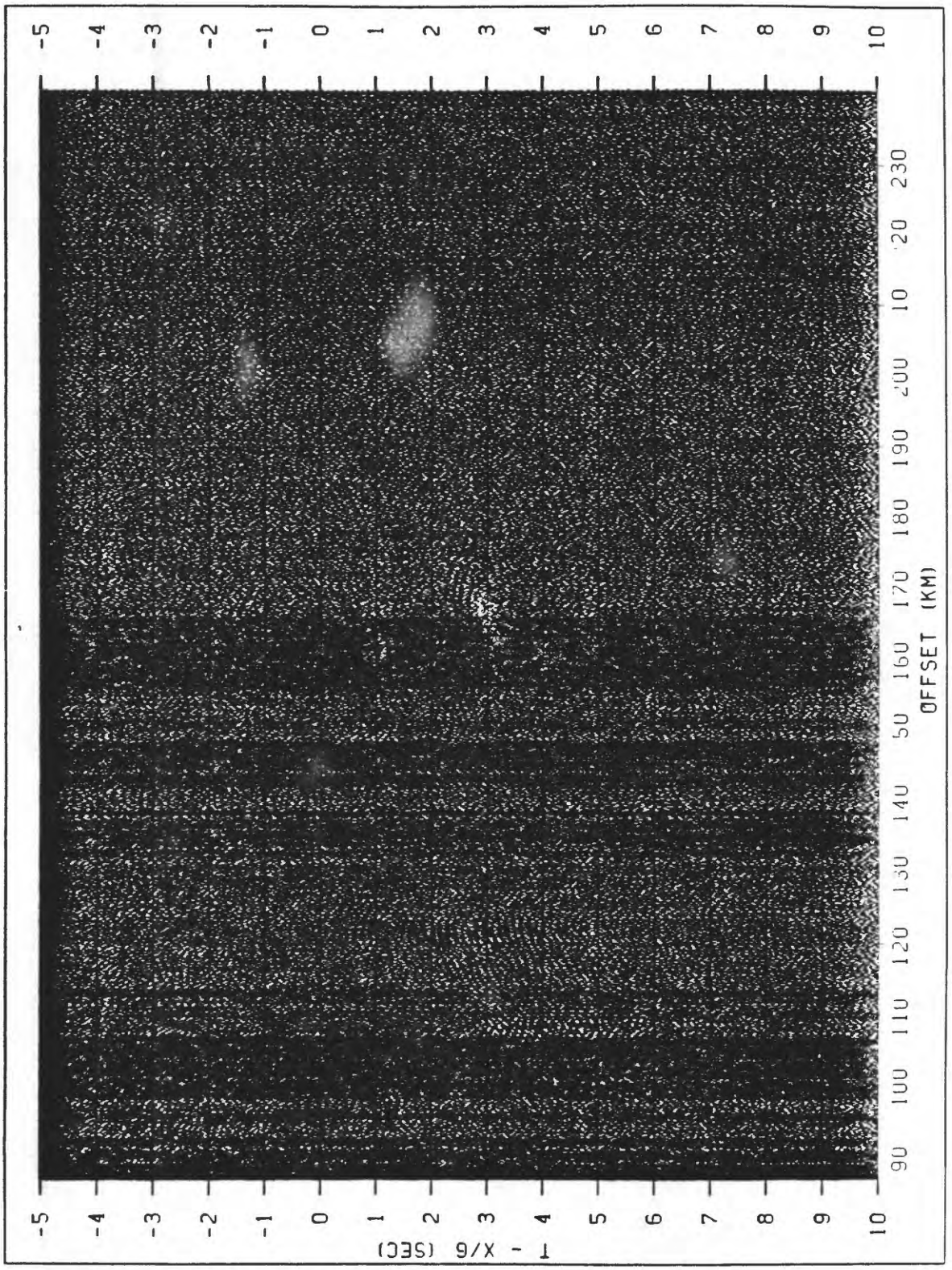


FIG. A-123. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 123
LINE 02 - GATHER 37 / STATION 7037

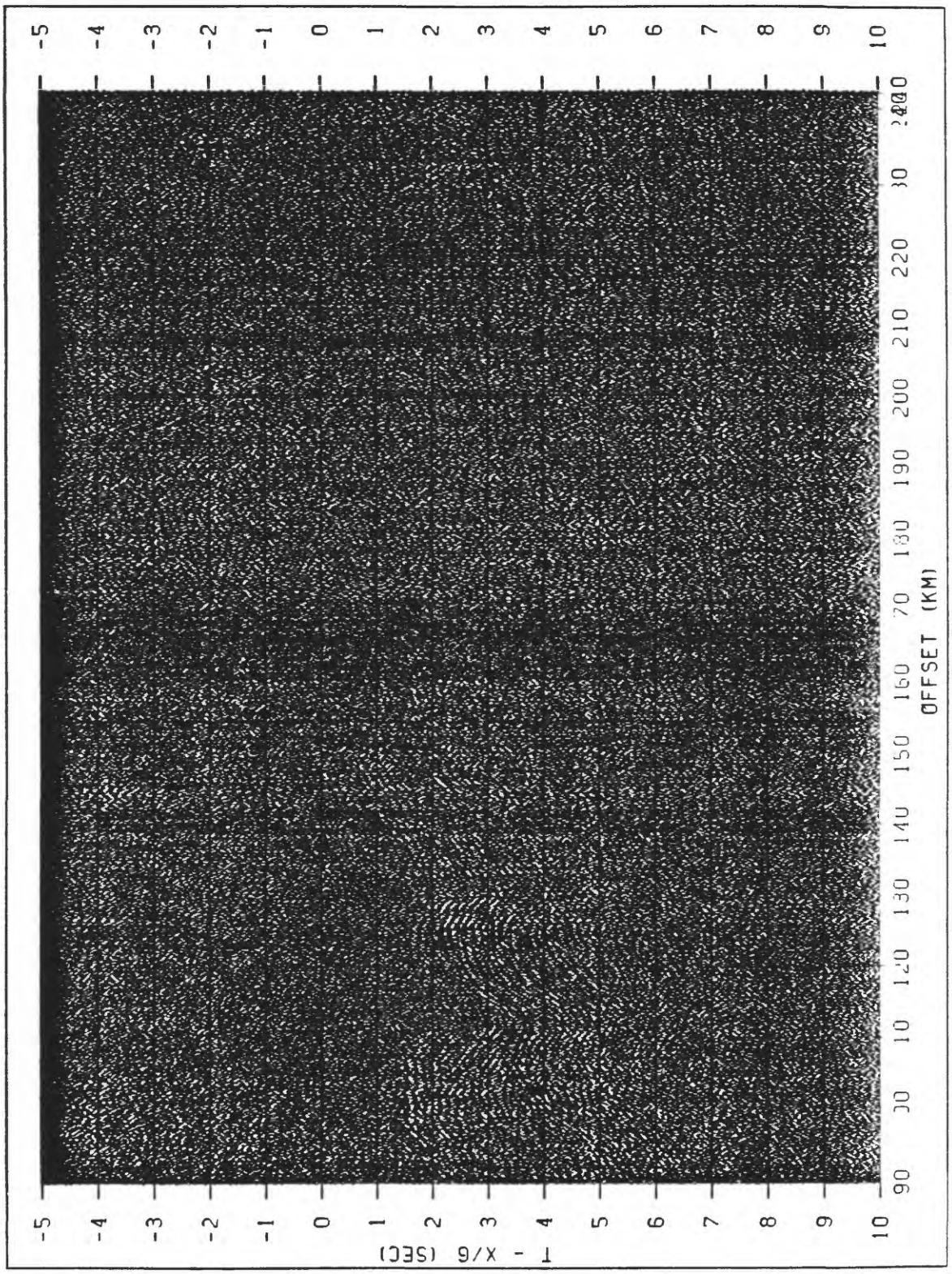


FIG. A-124. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 124
LINE 02 - GATHER 38 / STATION 7038

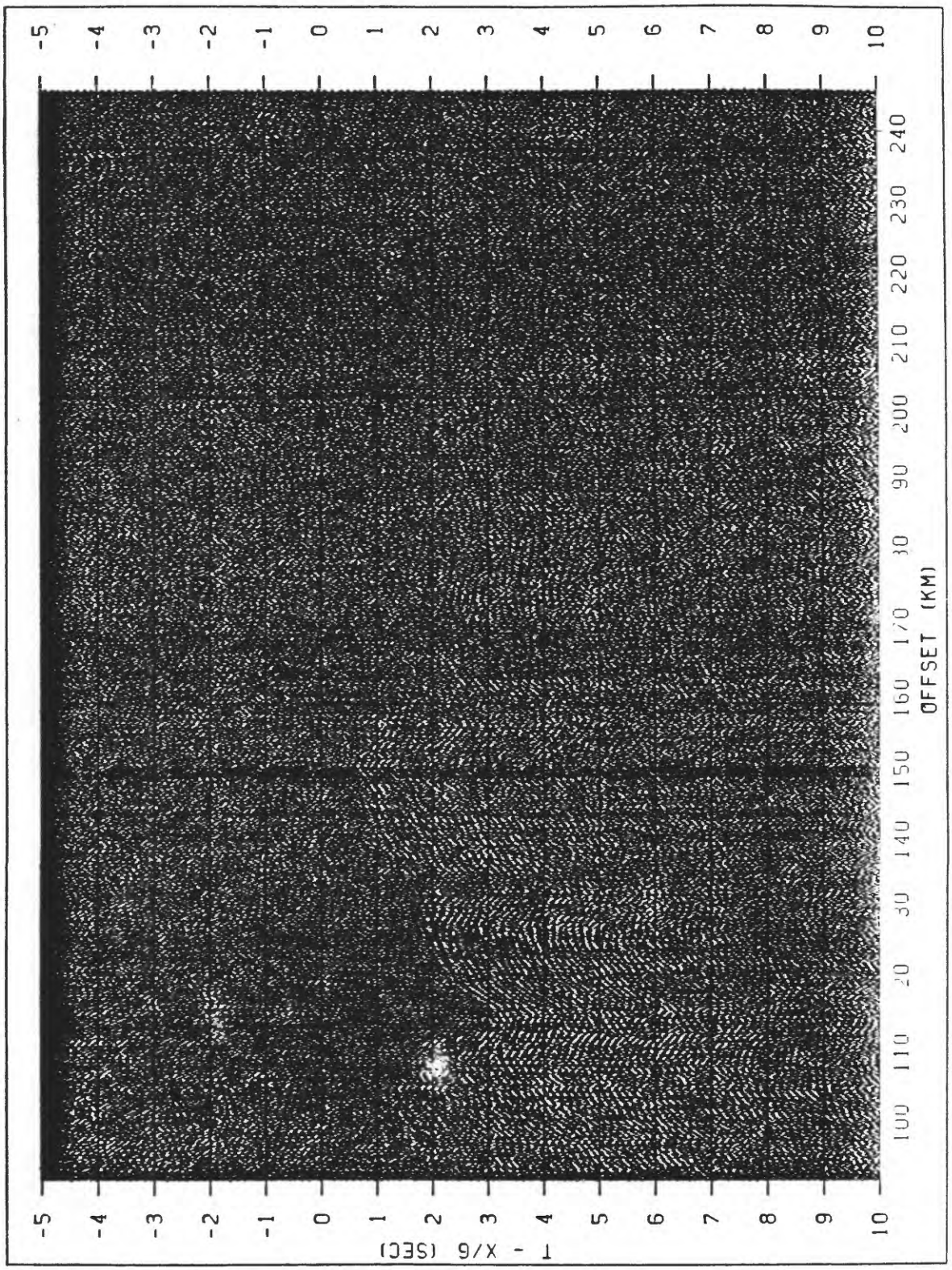


FIG. A-125. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 125
LINE 02 - GATHER 39 / STATION 7039

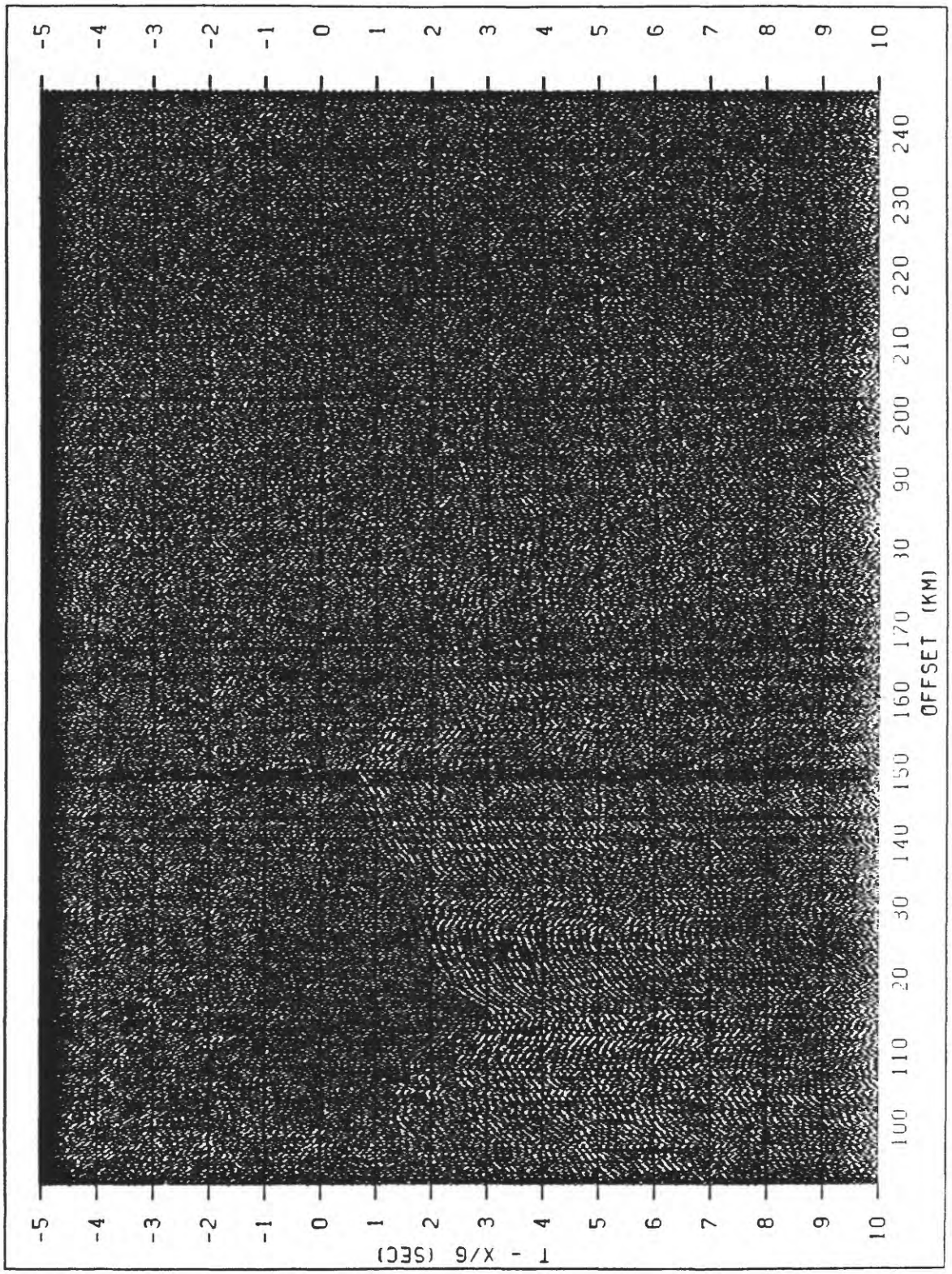


FIG. A-125. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 125
LINE 02 - GATHER 39 / STATION 7039

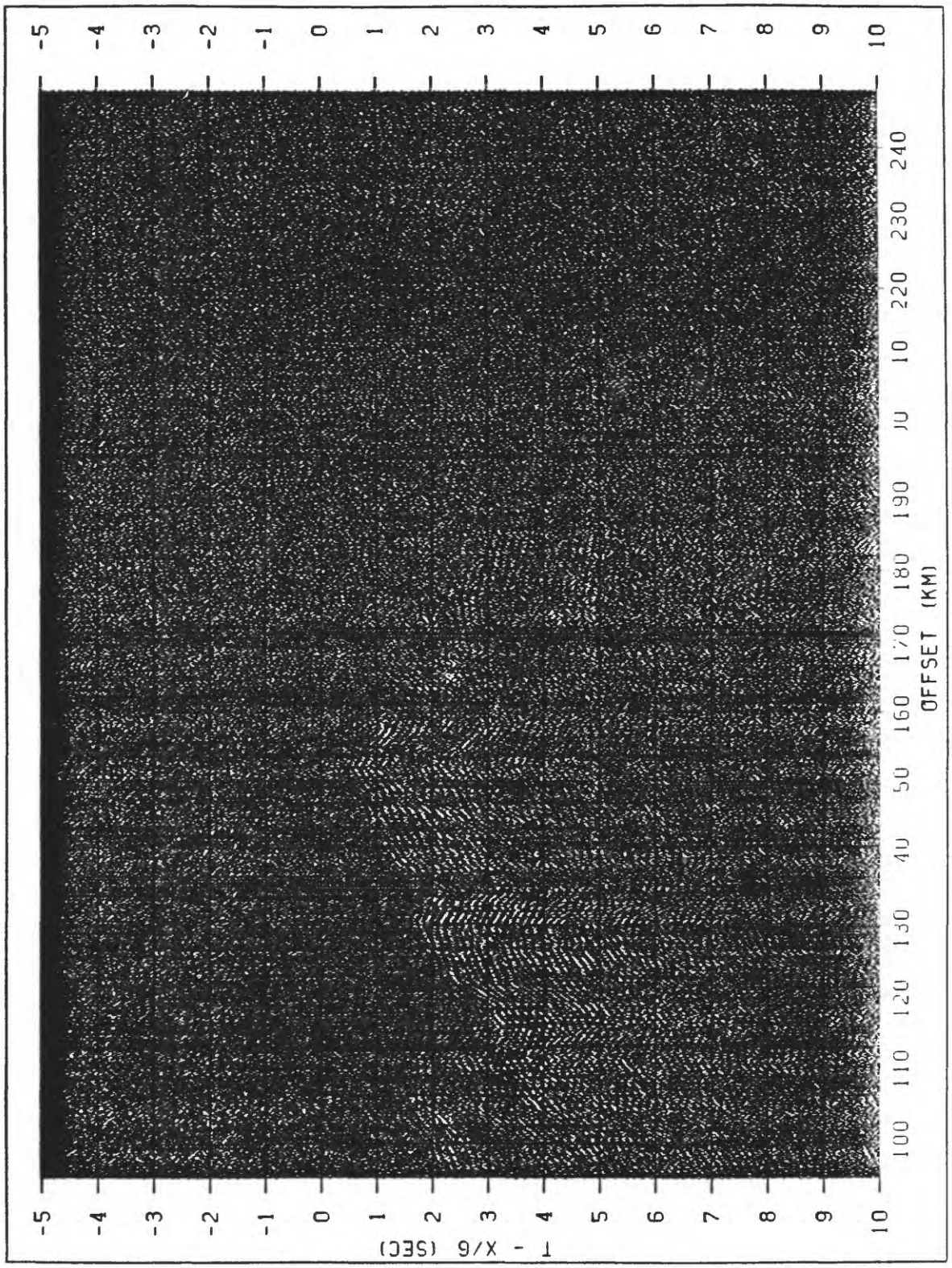


FIG. A-126. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 126
LINE 02 - GATHER 40 / STATION 7040

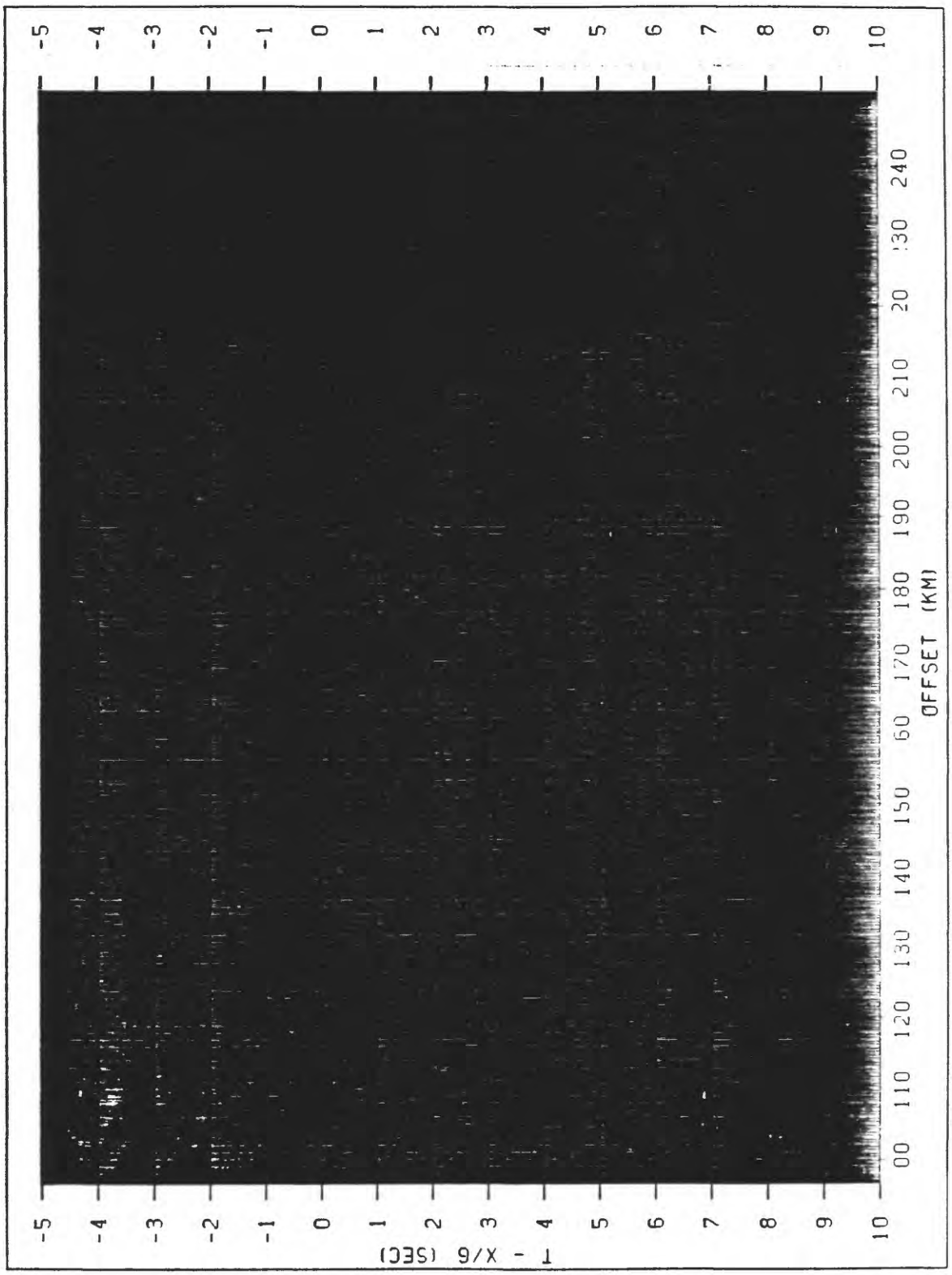


FIG. A-127. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 127
LINE 02 - GATHER 41 / STATION 7041

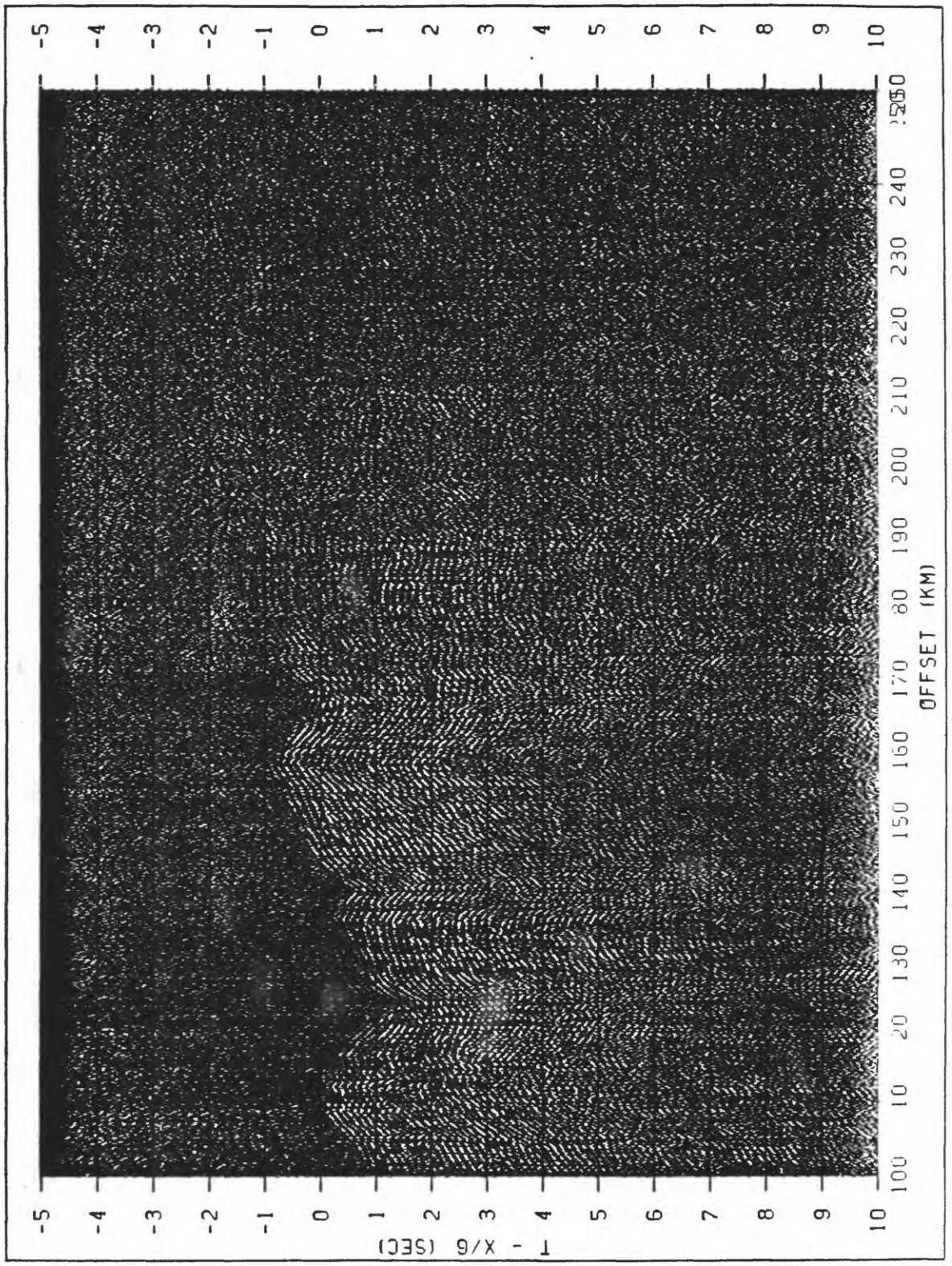


FIG. A-128. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 128
LINE 02 - GATHER 42 / STATION 7042

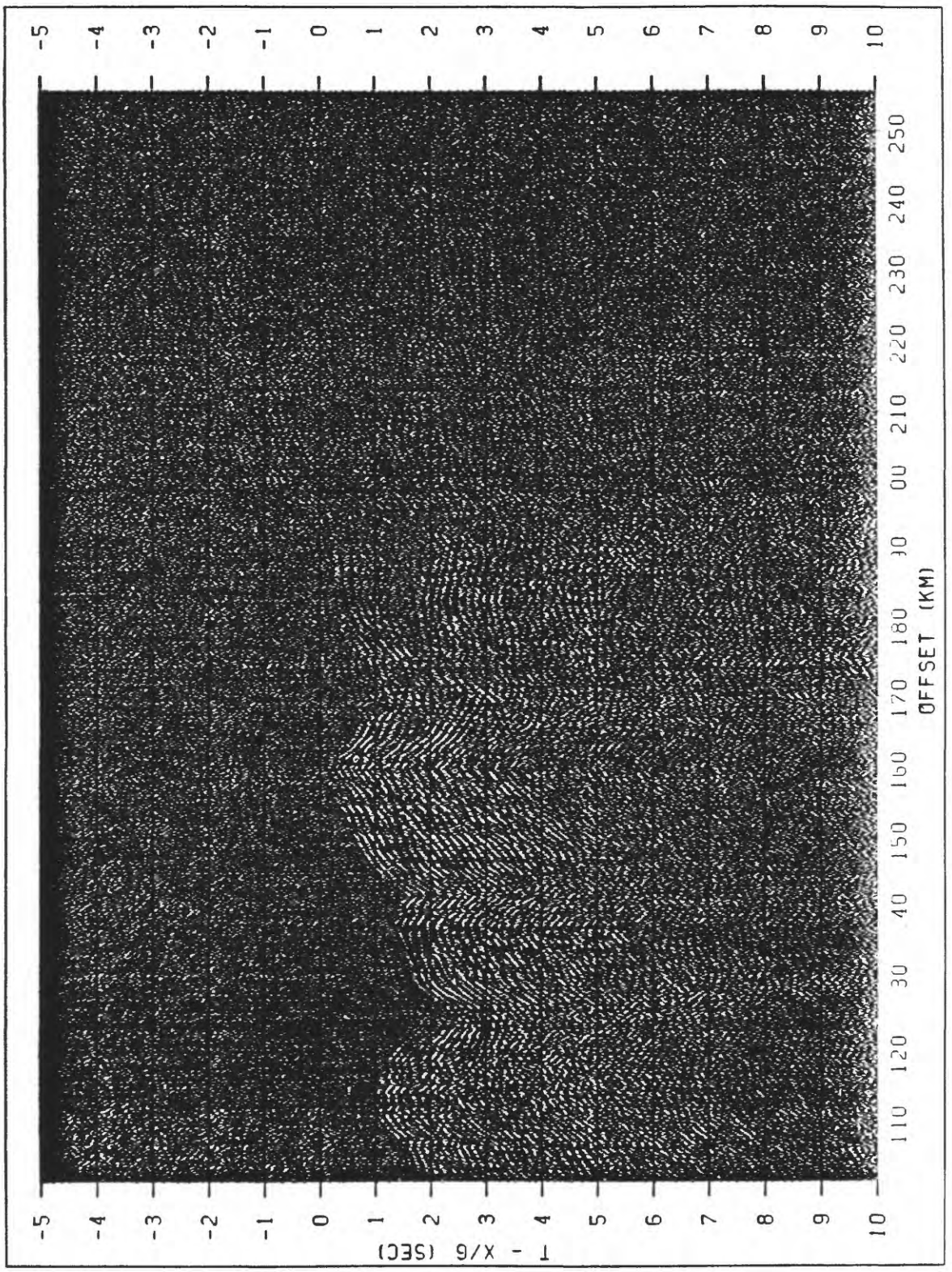


FIG. A-129. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 129
LINE 02 - GATHER 43 / STATION 7043

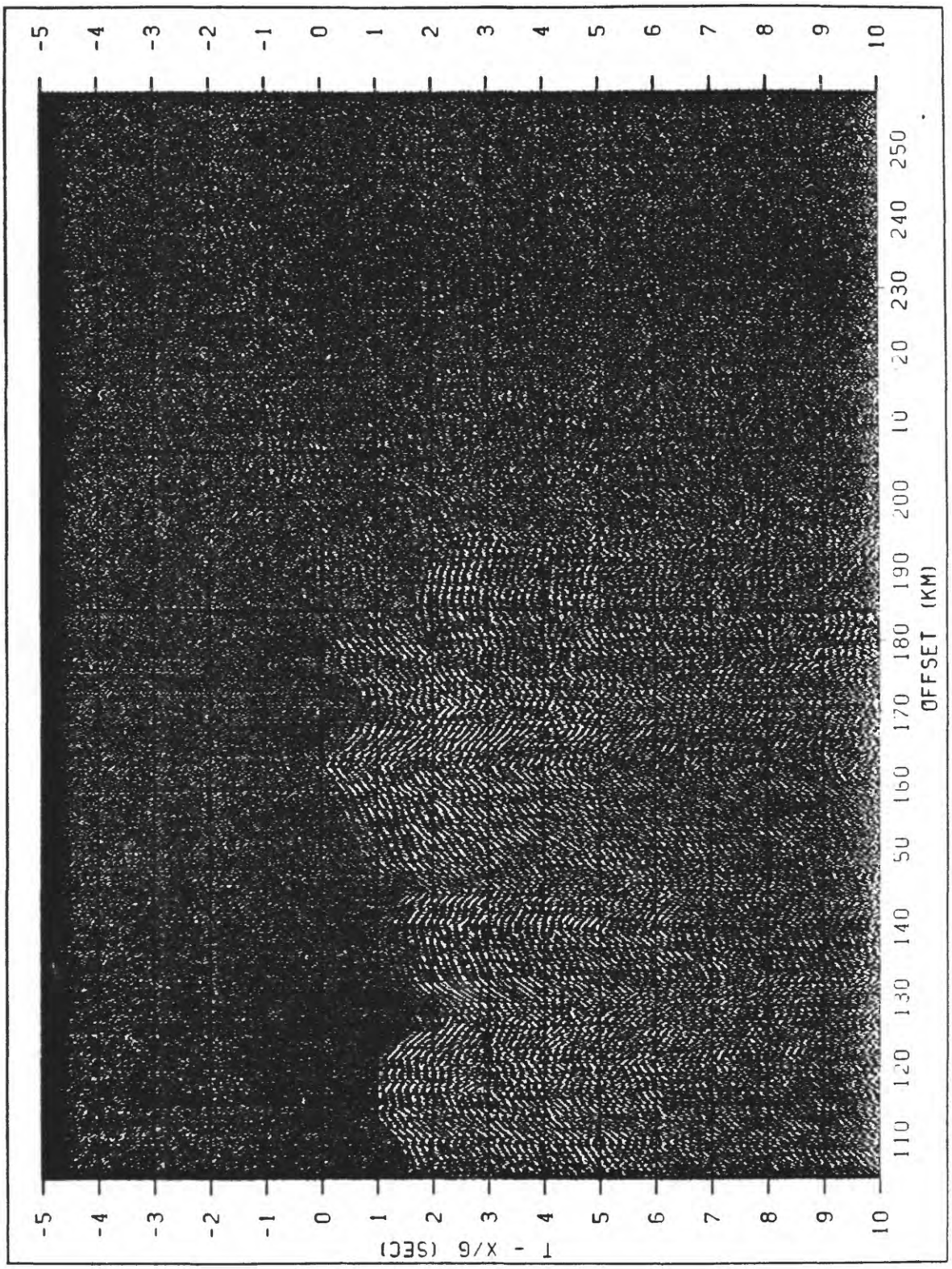


FIG. A-130. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 130
LINE 02 - GATHER 44 / STATION 7044

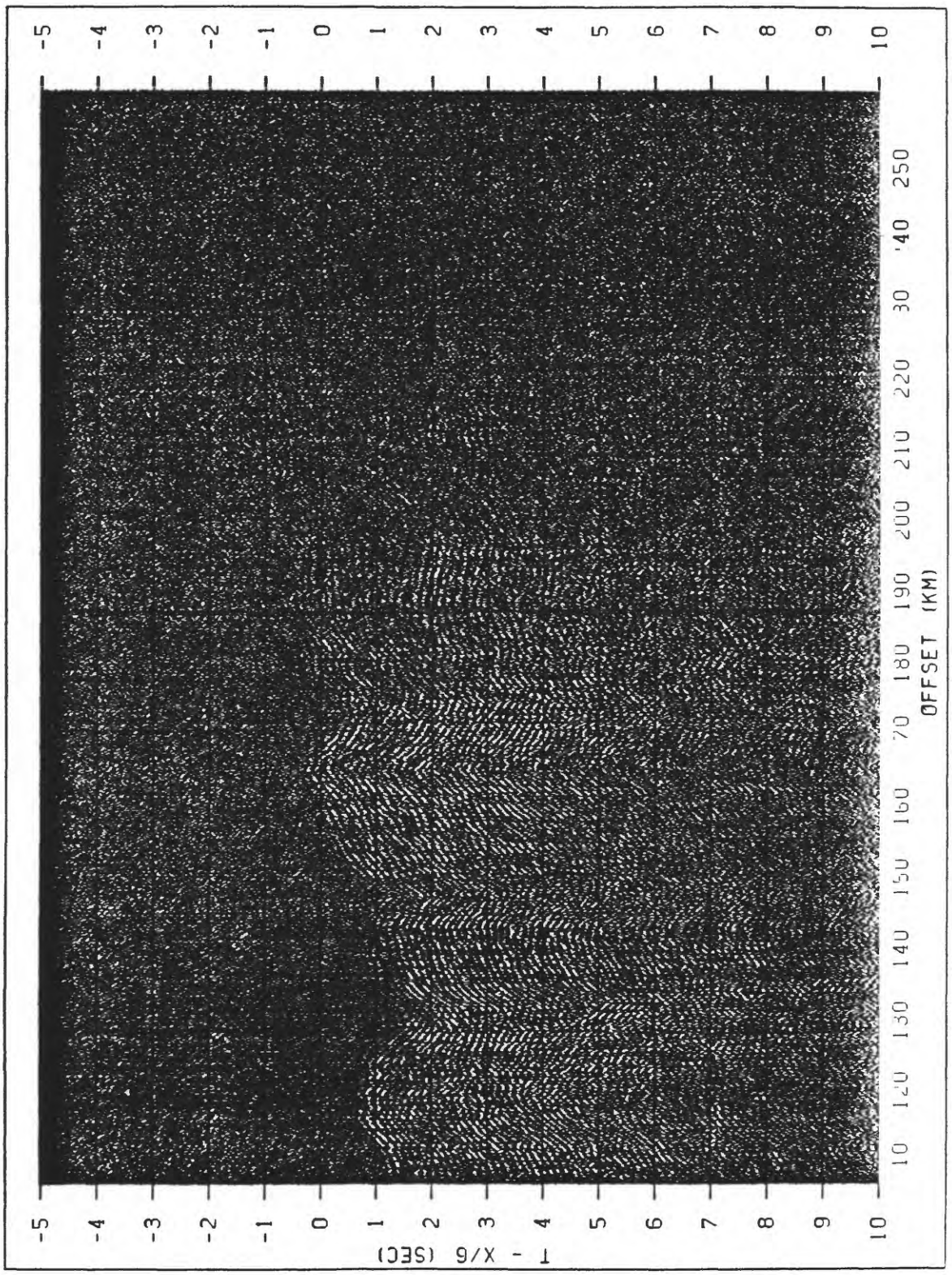


FIG. A-131. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 131
LINE 02 - GATHER 45 / STATION 7045

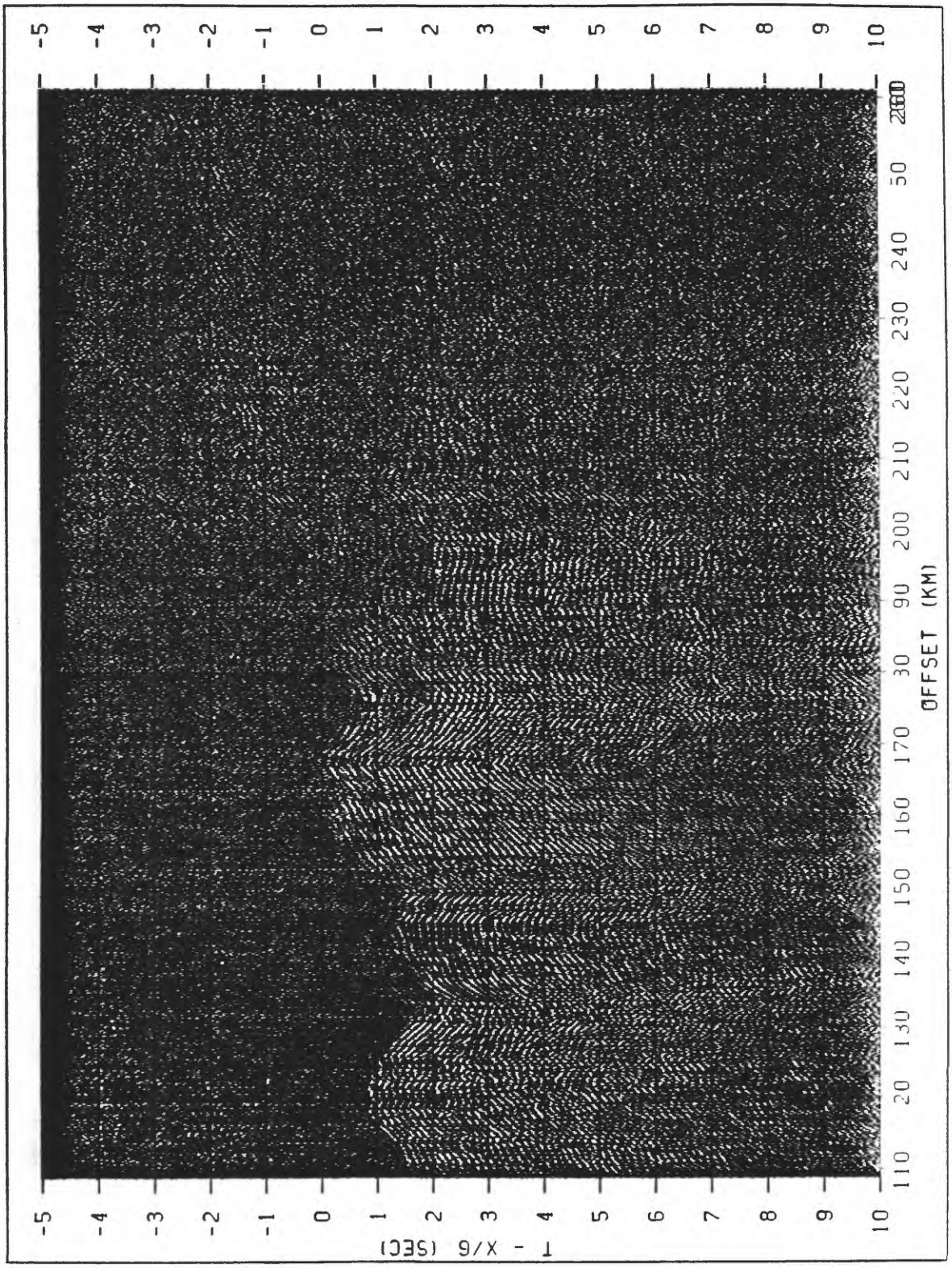


FIG. A-132. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 132
LINE 02 - GATHER 46 / STATION 7046

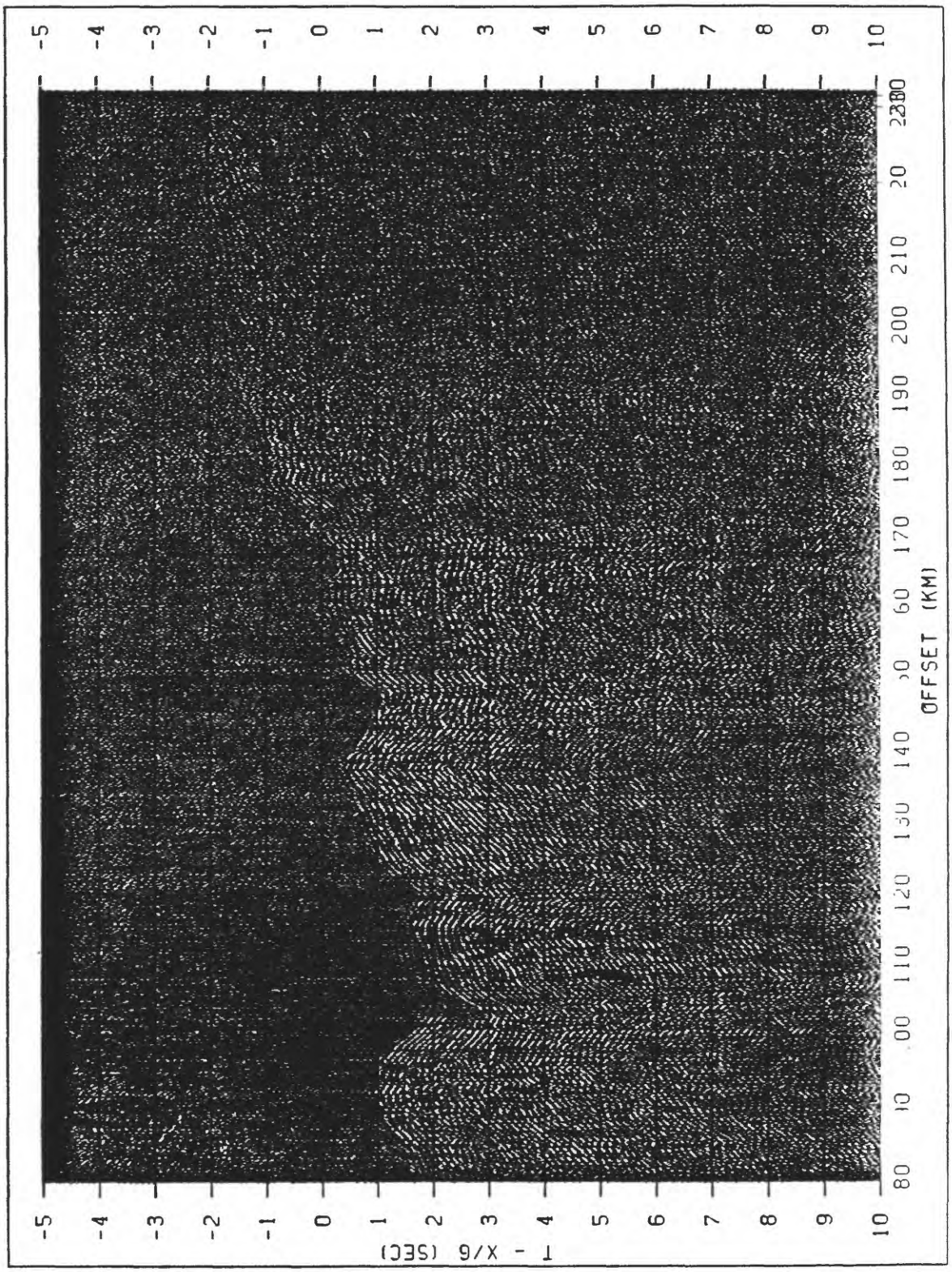


FIG. A-133. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 09 / OVERALL GATHER 133
LINE 02 - GATHER 47 / STATION 7050

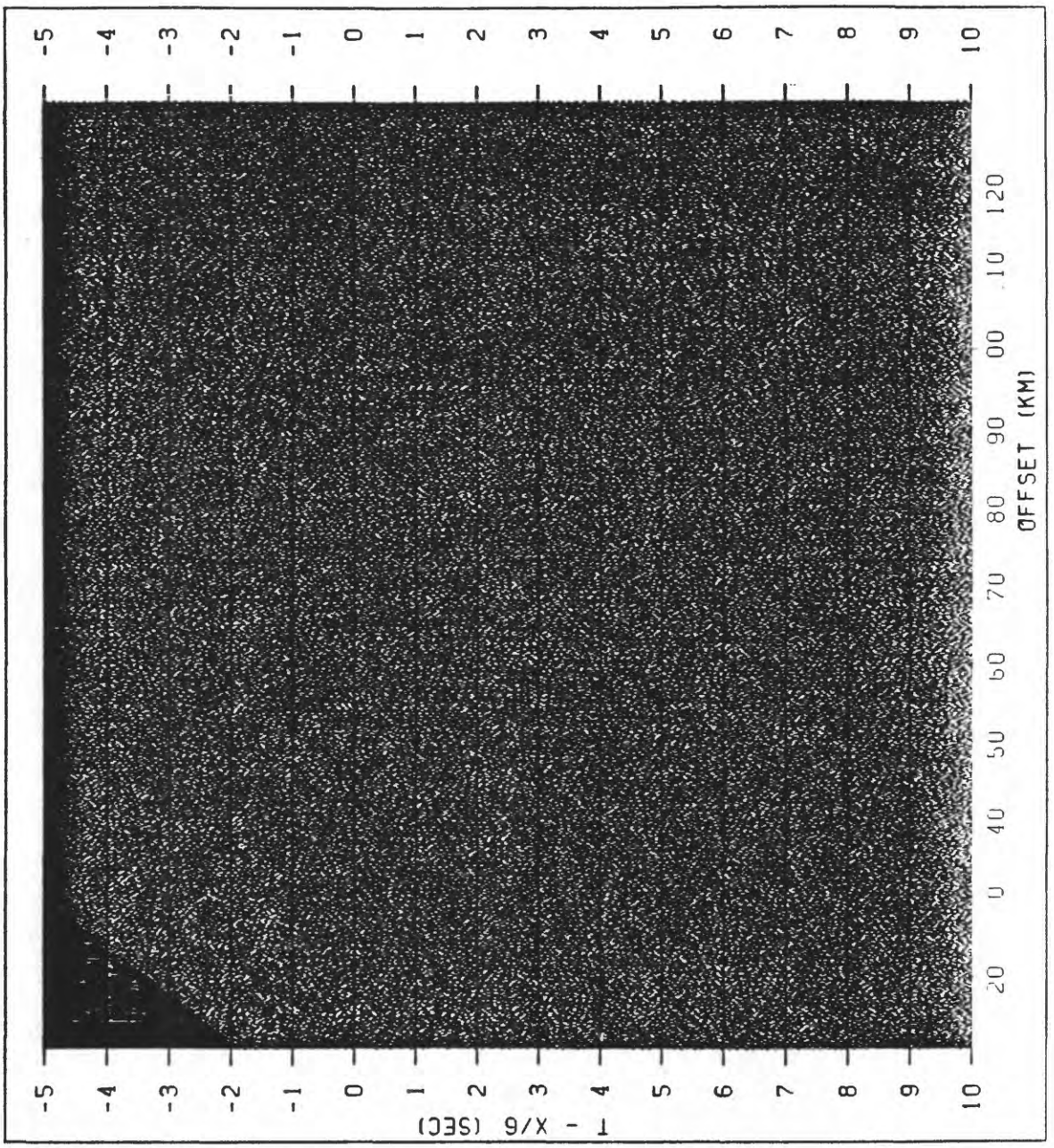


FIG. A-134. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 134
LINE 03 - GATHER 01 / STATION 6001

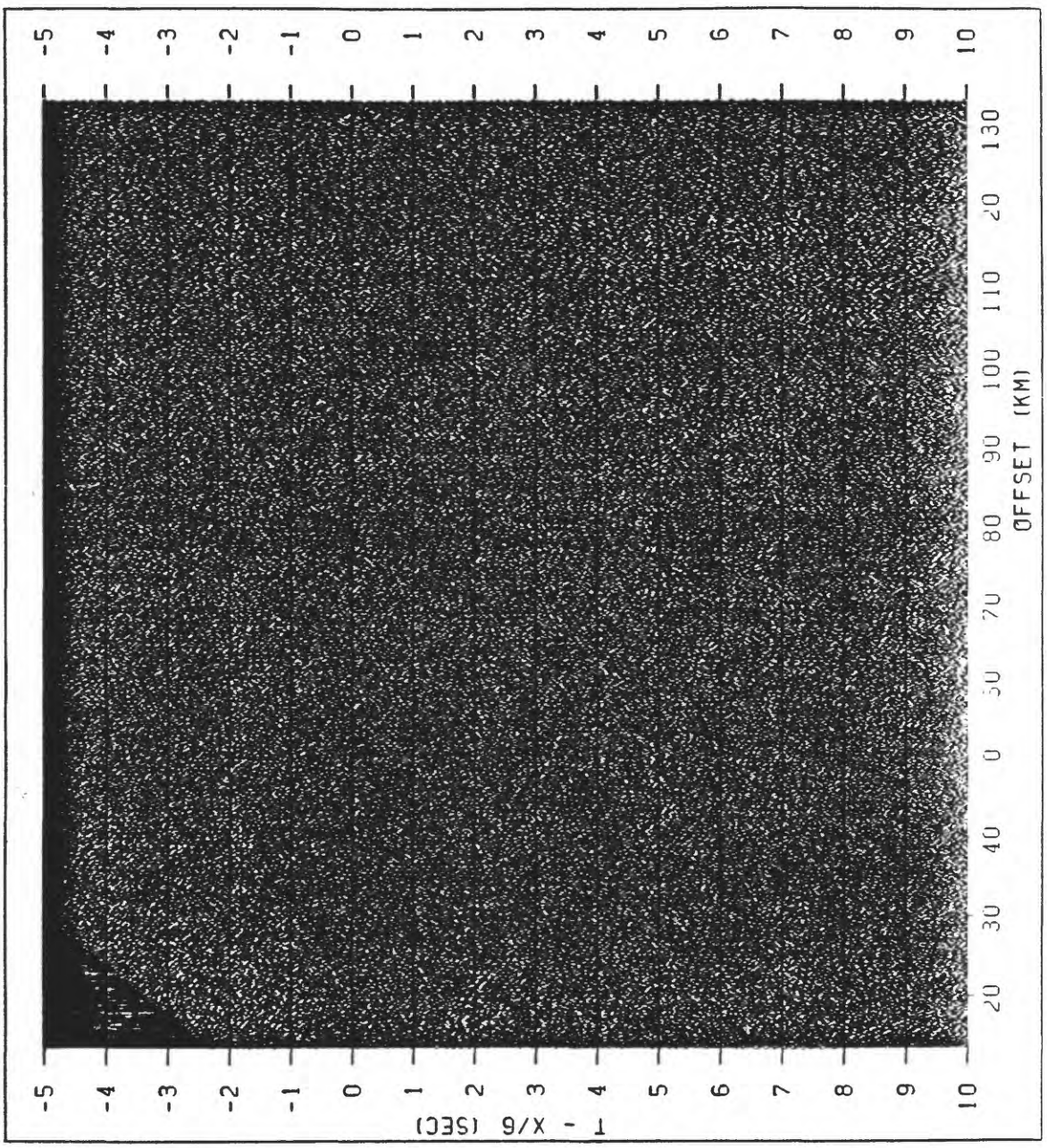


FIG. A-135. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 135
LINE 03 - GATHER 02 / STATION 6002

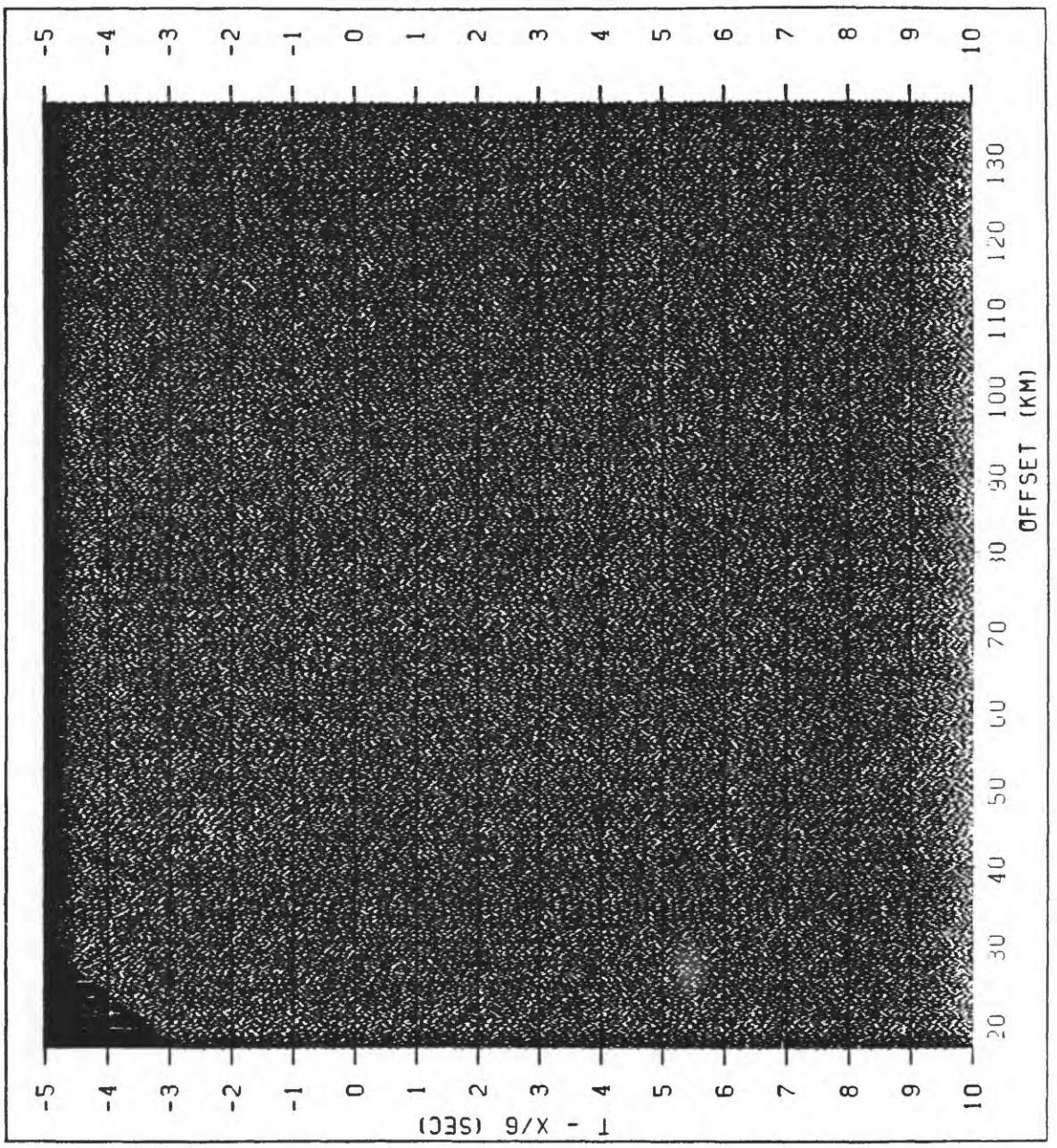


FIG. A-136. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 136
LINE 03 - GATHER 03 / STATION 6003

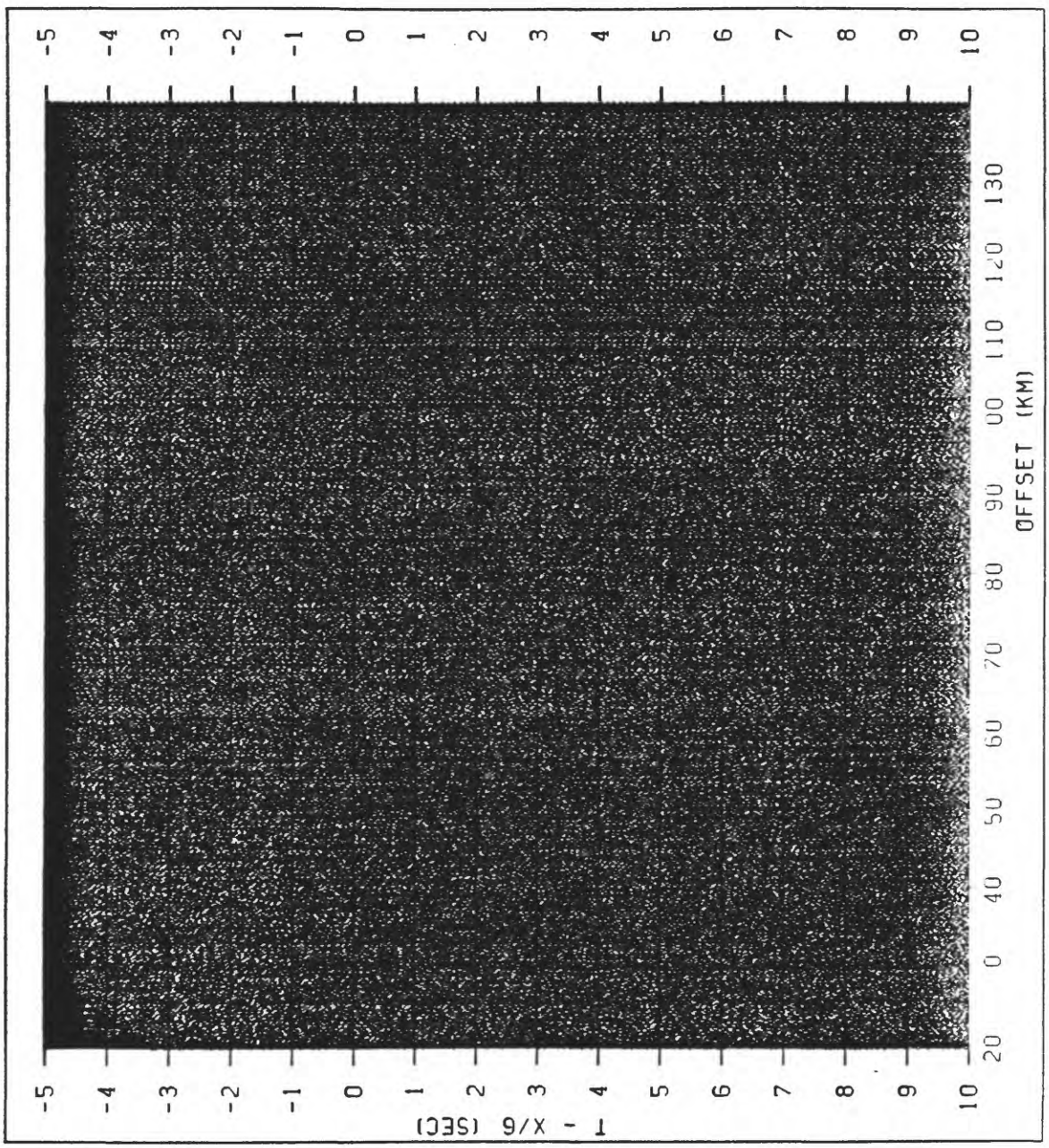


FIG. A-137. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 137
LINE 03 - GATHER 04 / STATION 6004

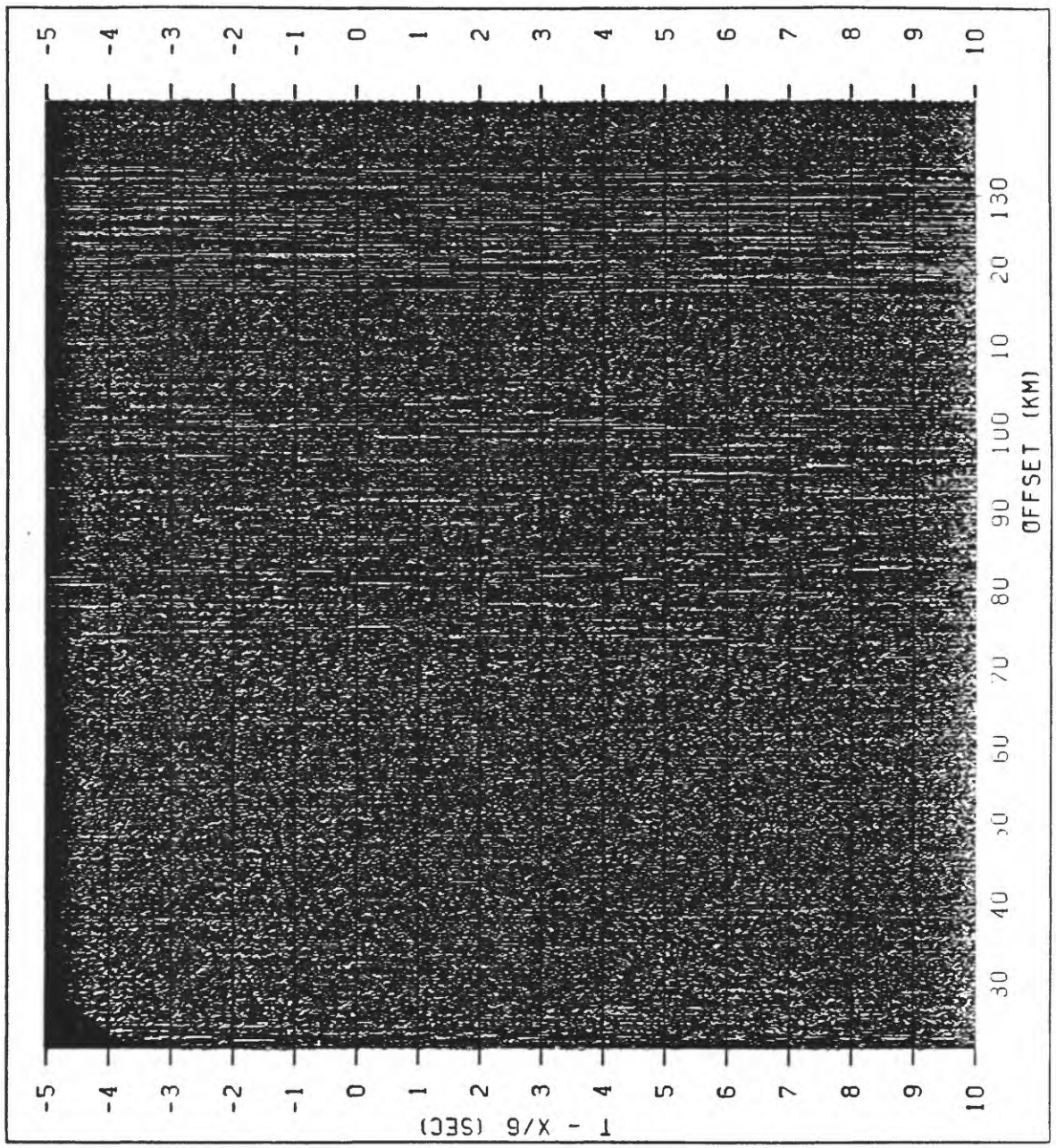


FIG. A-138. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 138
LINE 03 - GATHER 05 / STATION 6005

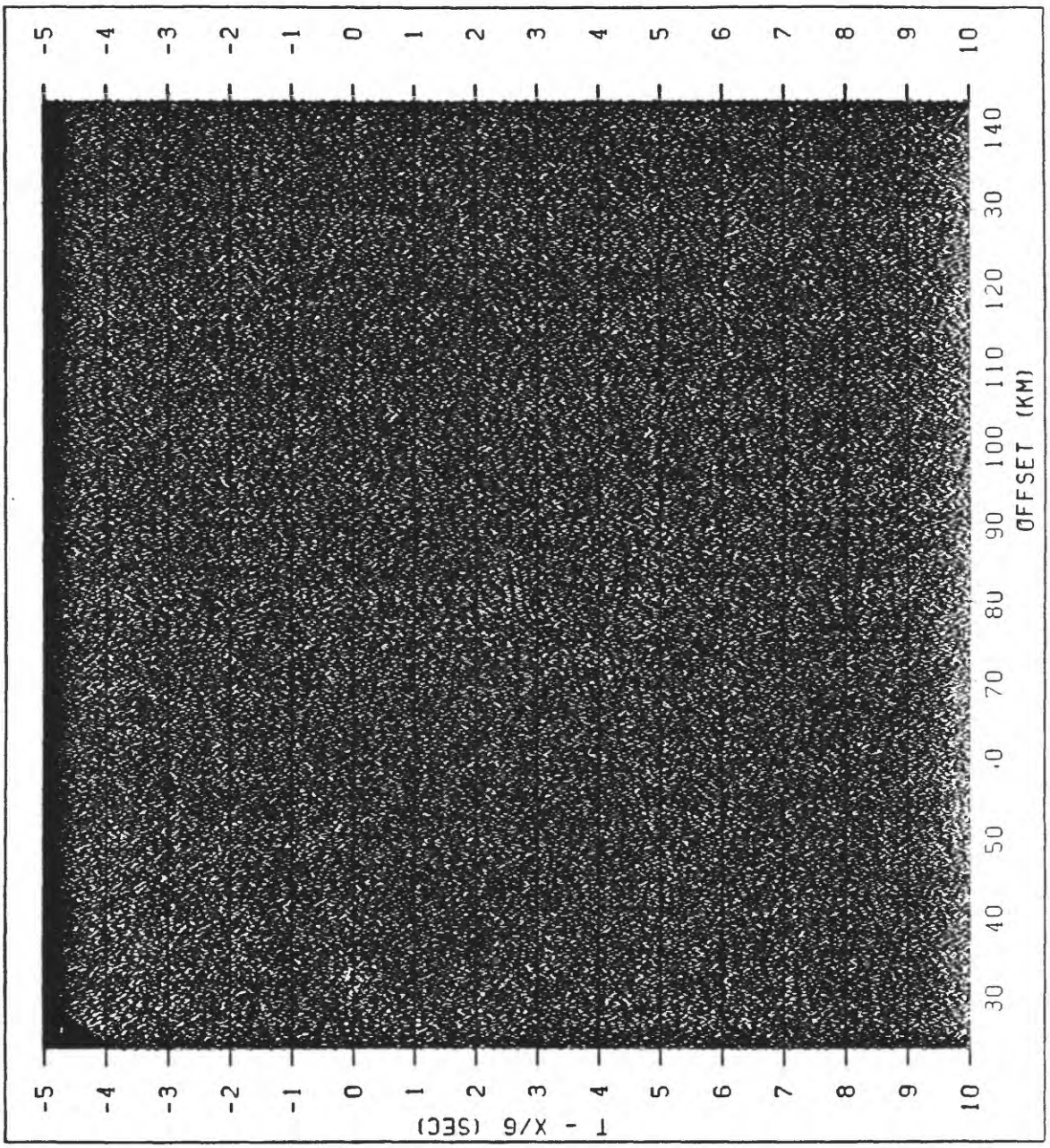


FIG. A-139. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 139
LINE 03 - GATHER 06 / STATION 6006

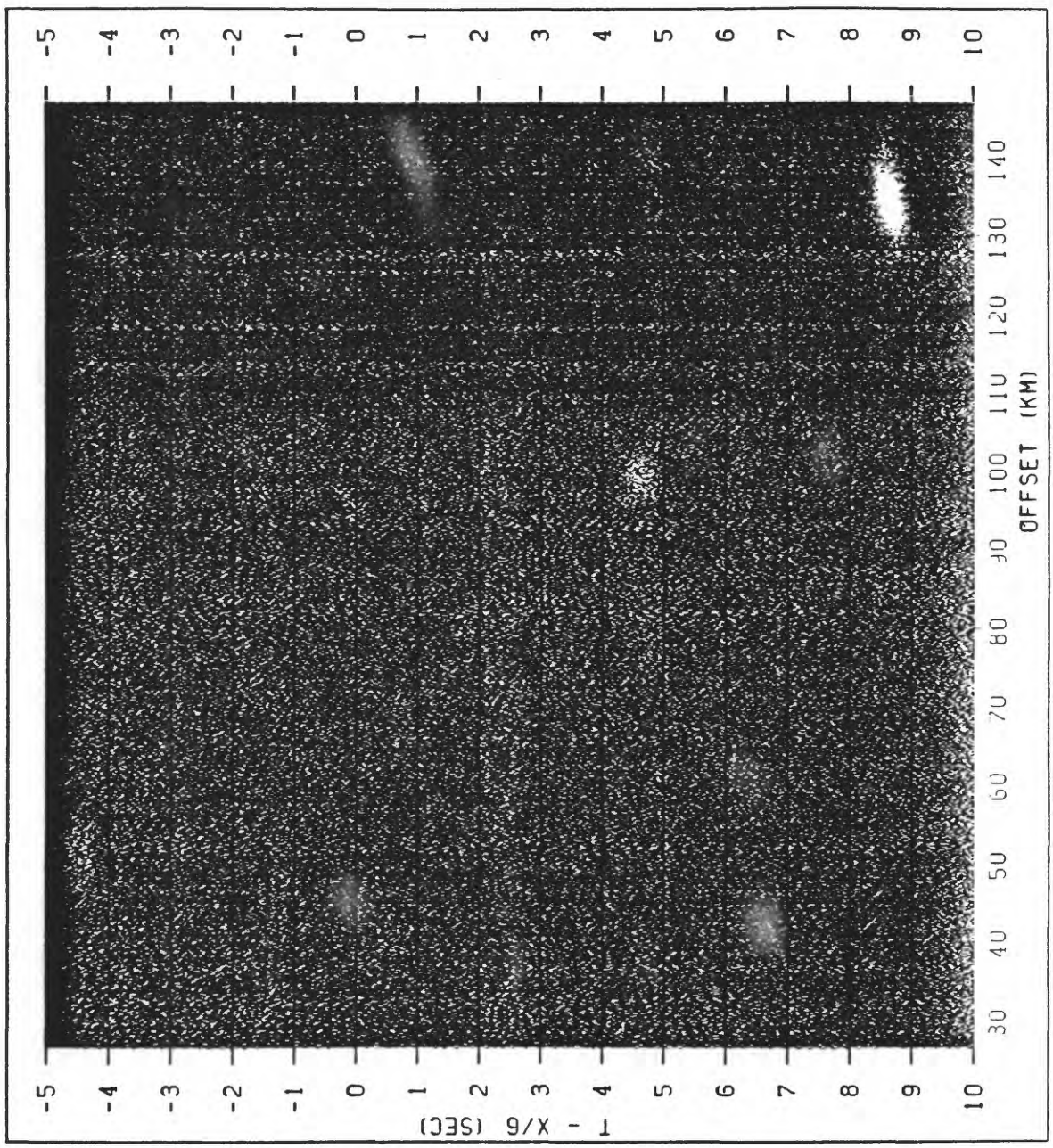


FIG. A-140. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 140
LINE 03 - GATHER 07 / STATION 6007

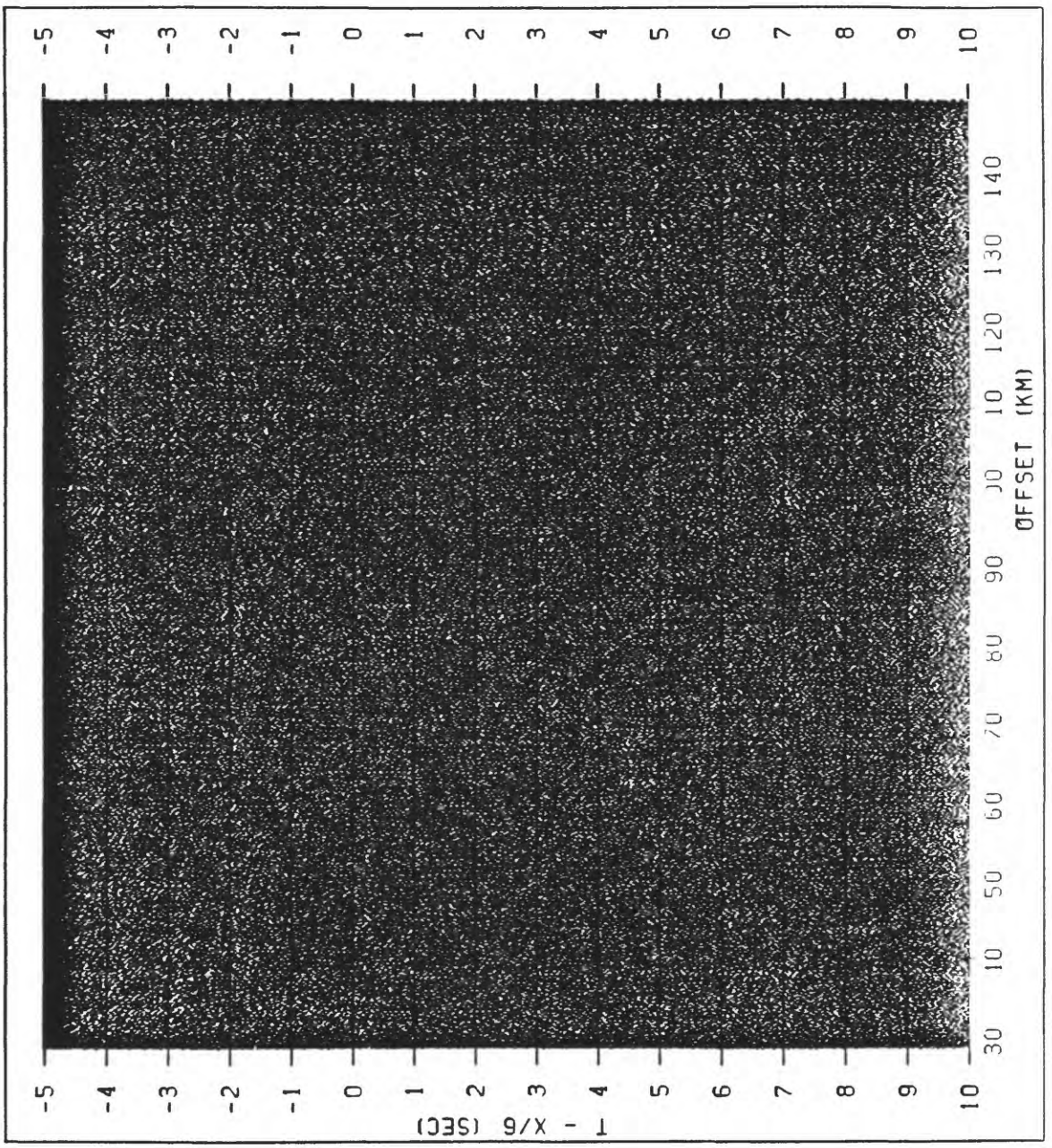


FIG. A-141. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 141
LINE 03 - GATHER 08 / STATION 6008

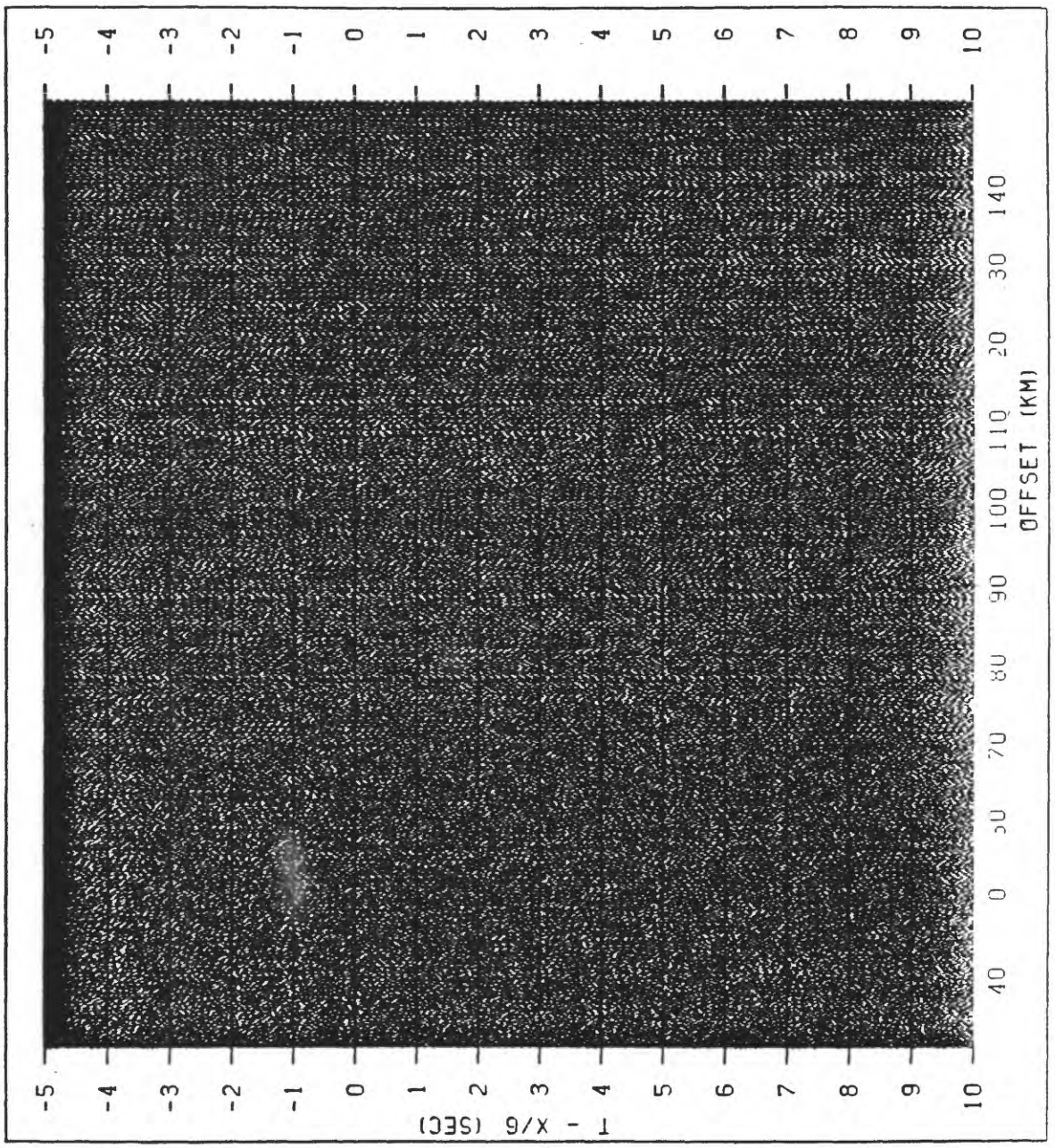


FIG. A-142. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 142
LINE 03 - GATHER 09 / STATION 6009

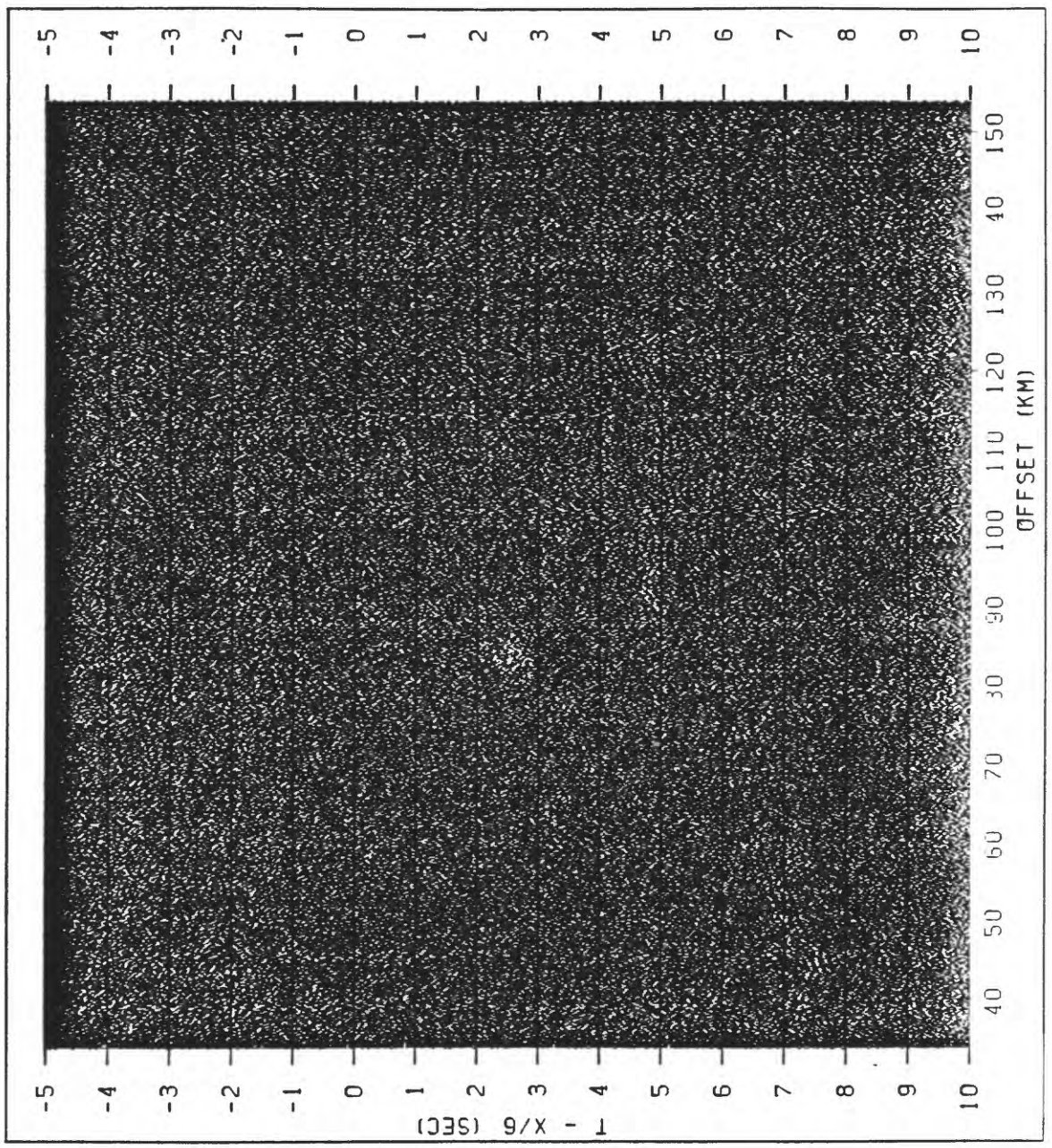


FIG. A-143. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 143
LINE 03 - GATHER 10 / STATION 7010

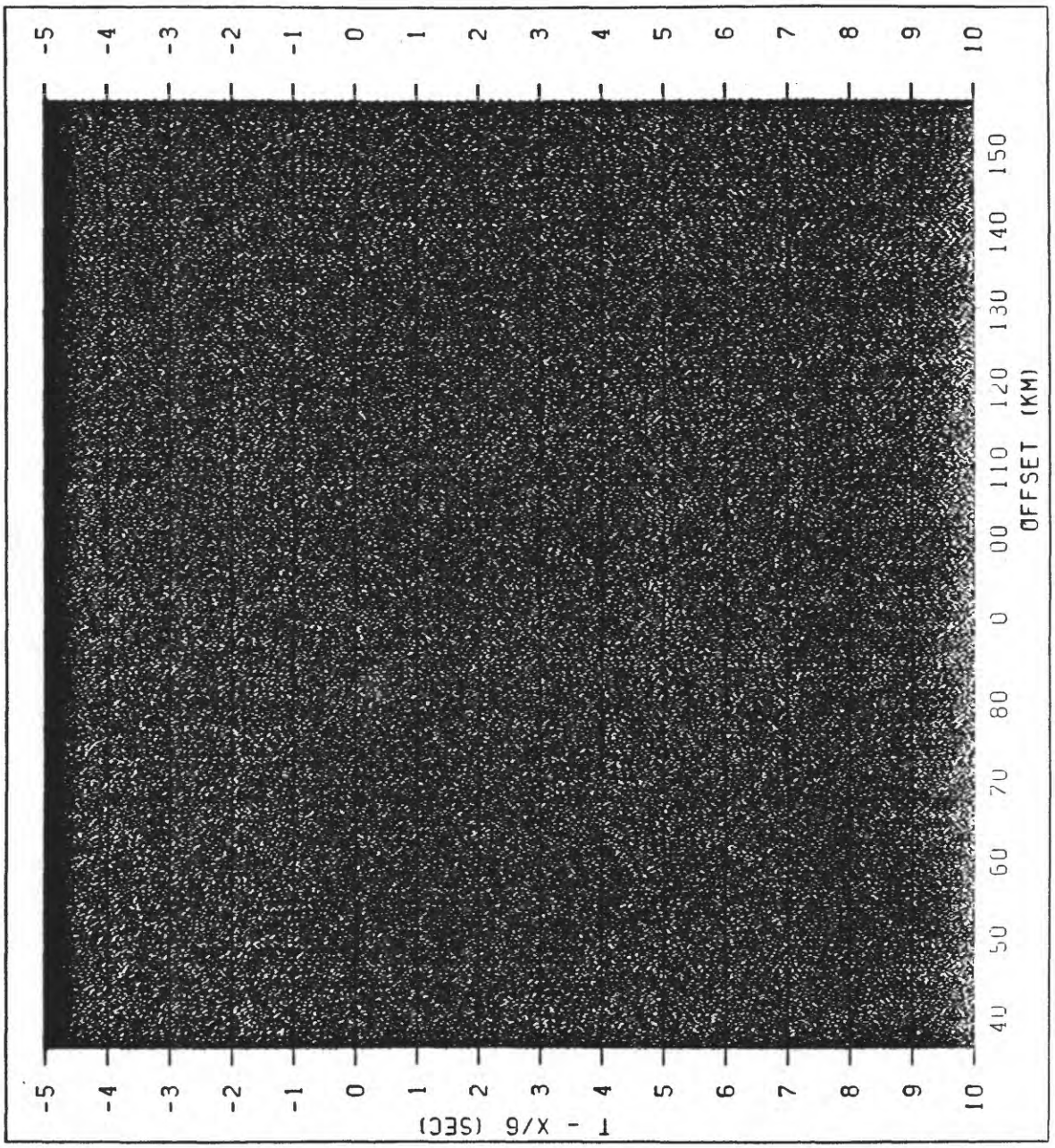


FIG. A-144. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 144
LINE 03 - GATHER 11 / STATION 6011

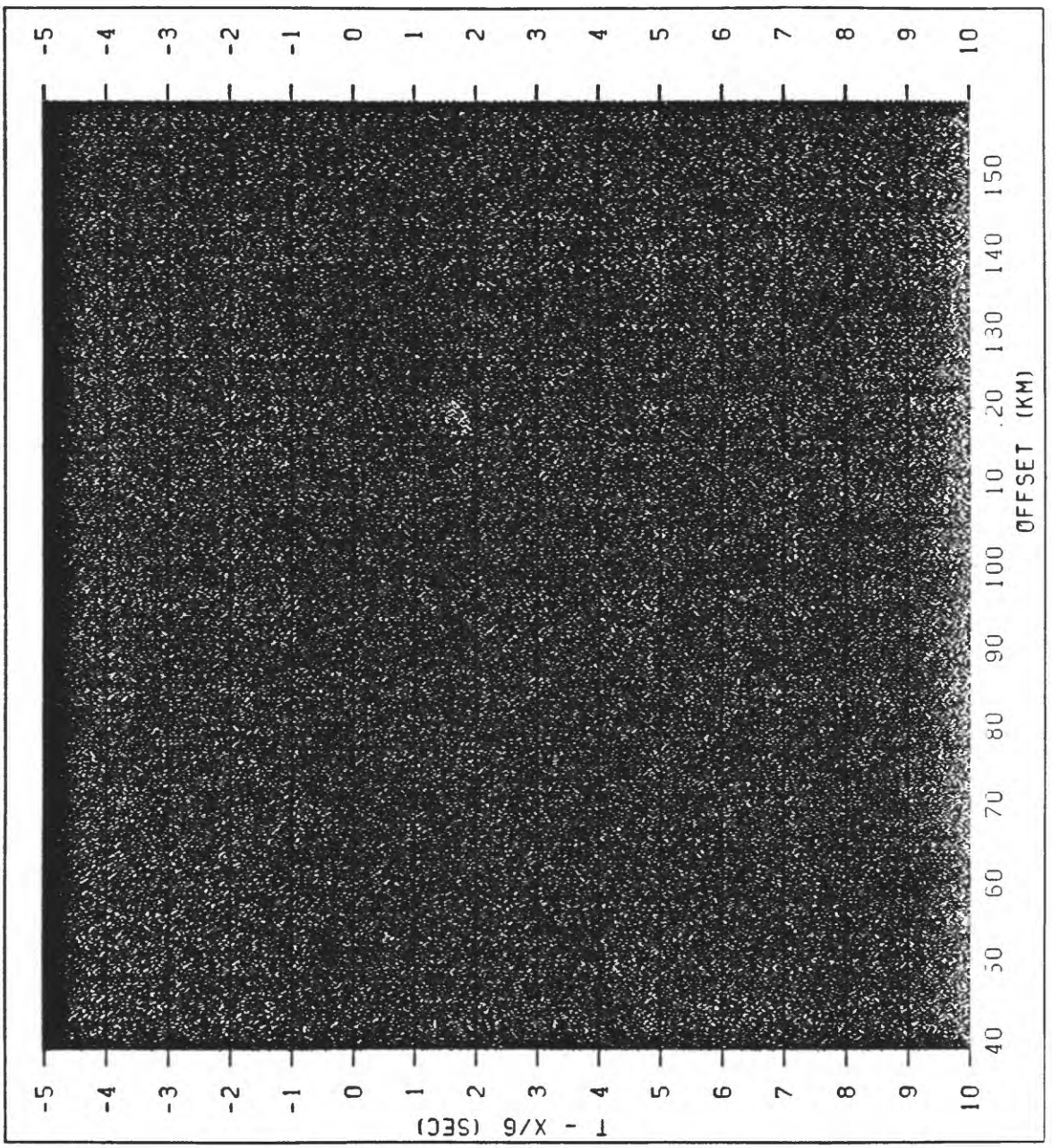


FIG. A-145. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 145
LINE 03 - GATHER 12 / STATION 6012

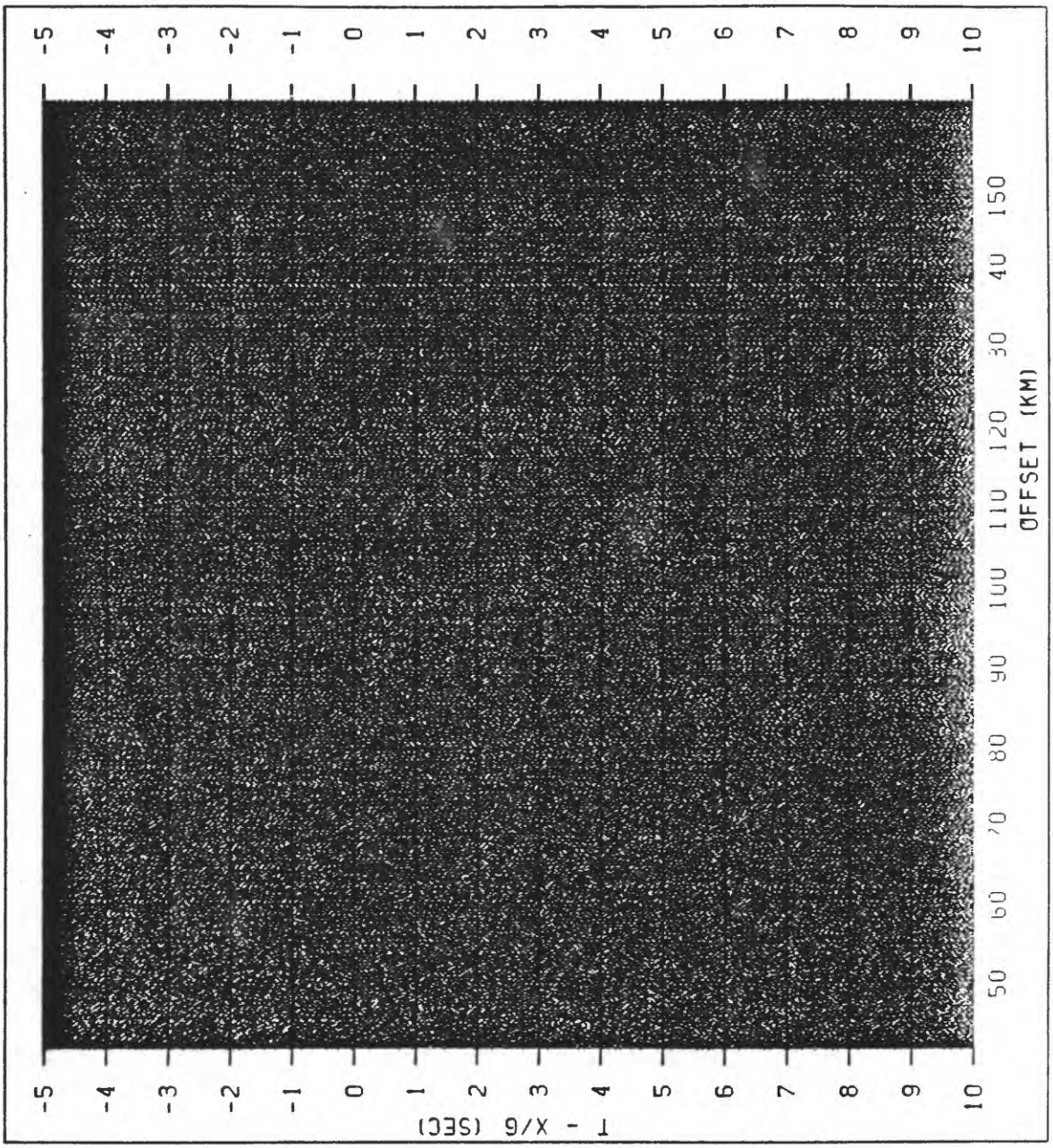


FIG. A-146. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 146
LINE 03 - GATHER 13 / STATION 6013

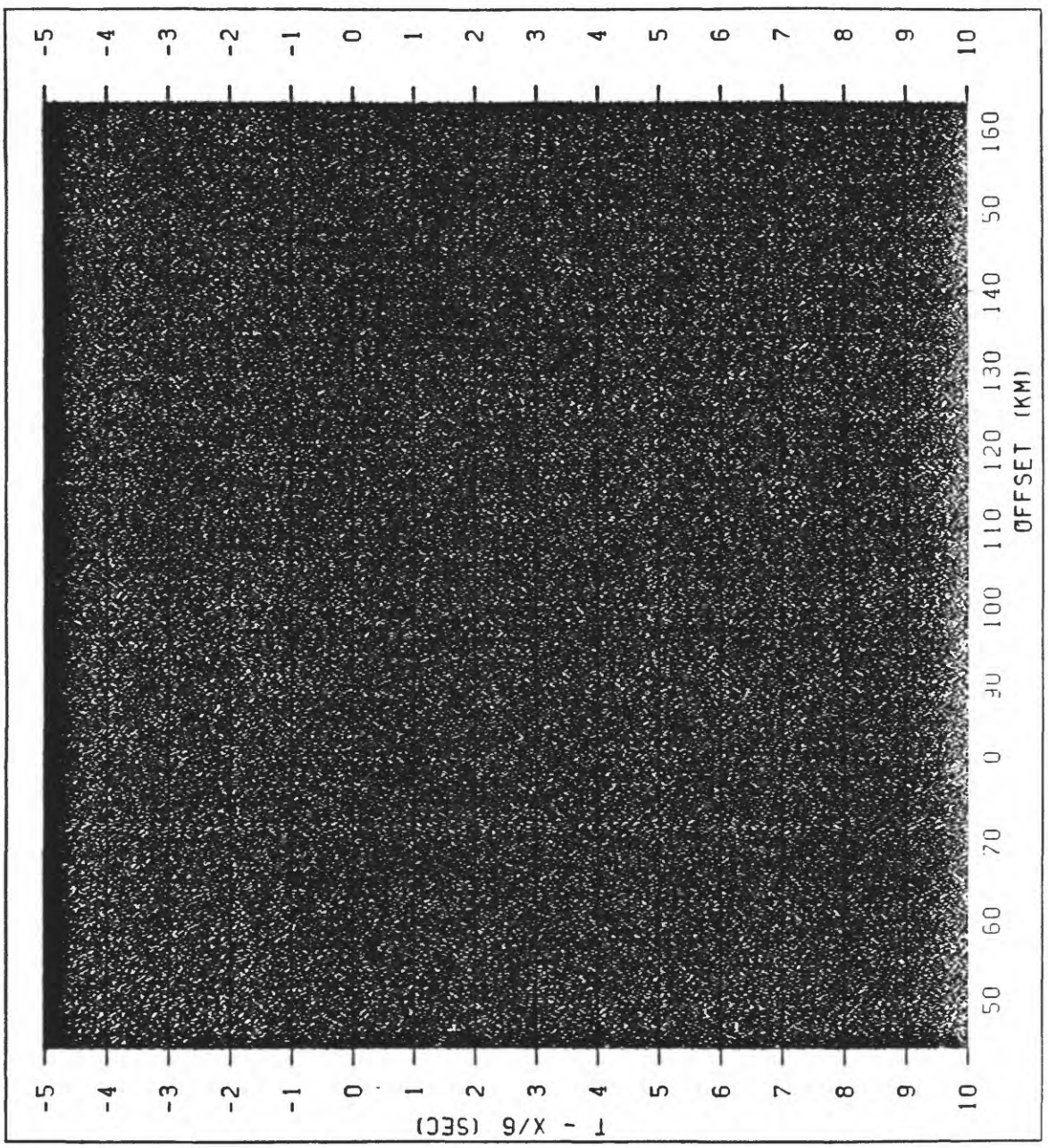


FIG. A-147. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 147
LINE 03 - GATHER 14 / STATION 6014

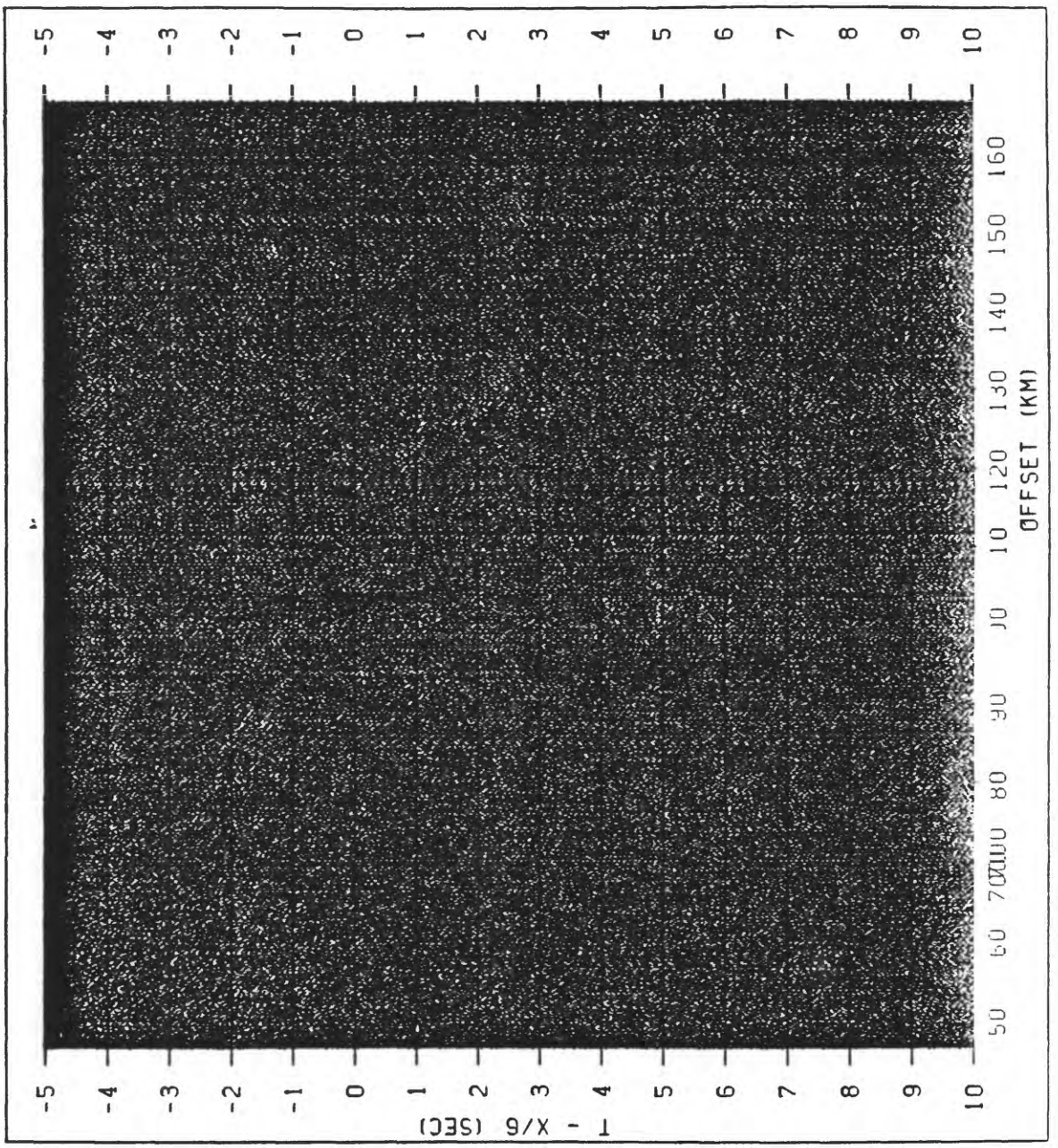


FIG. A-148. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 148
LINE 03 - GATHER 15 / STATION 6015

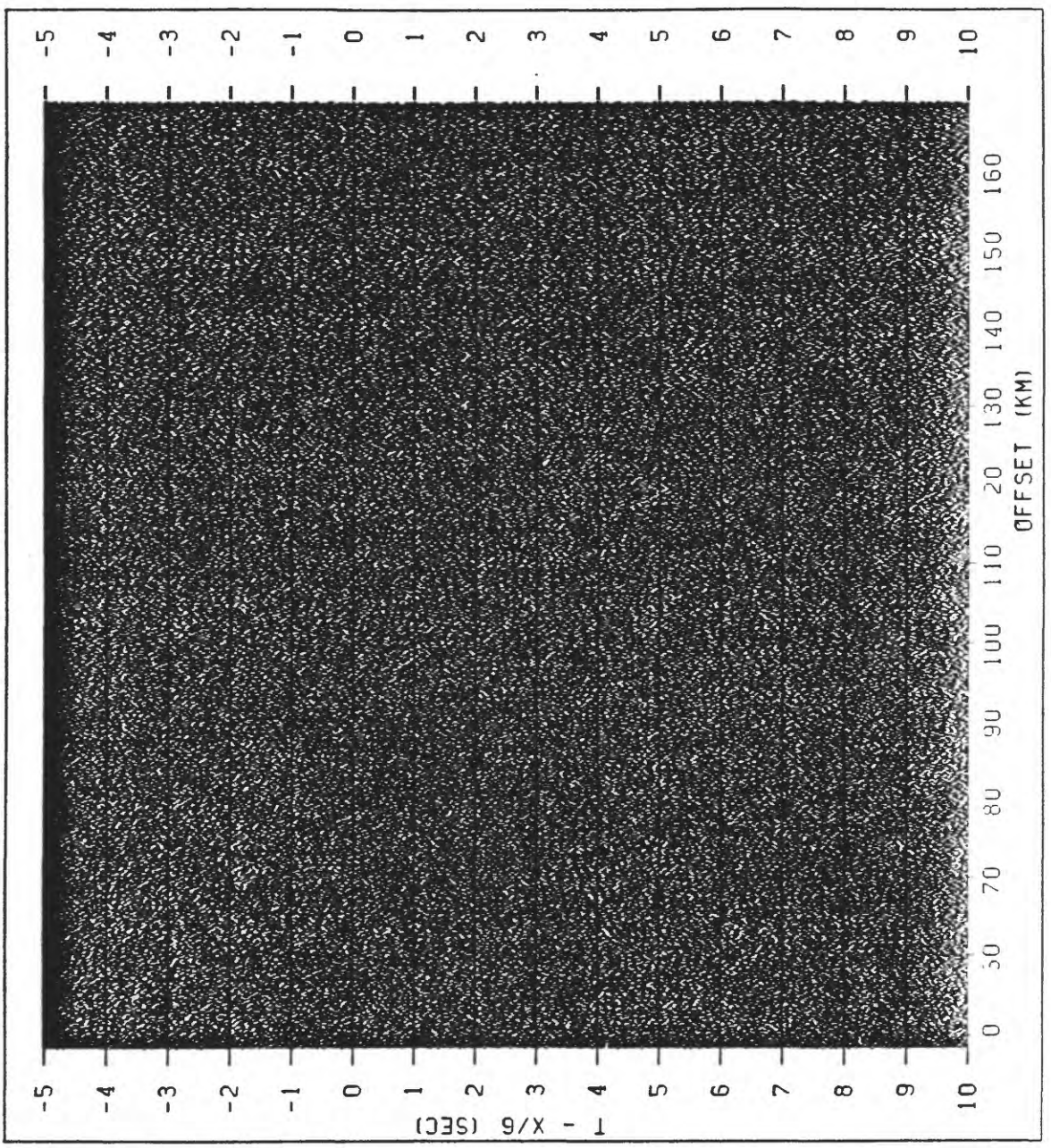


FIG. A-149. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 149
LINE 03 - GATHER 16 / STATION 6016

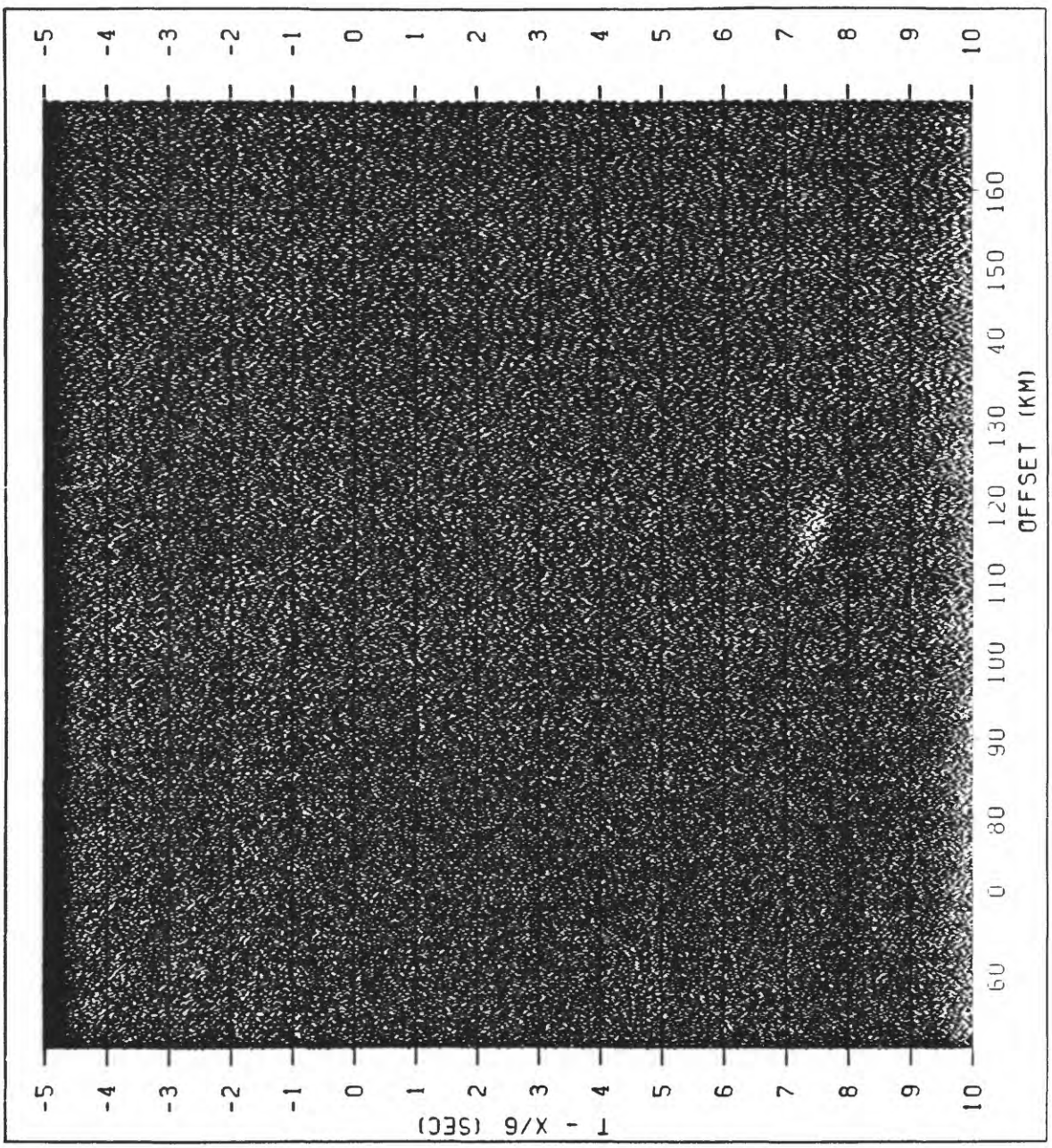


FIG. A-150. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 150
LINE 03 - GATHER 17 / STATION 6017

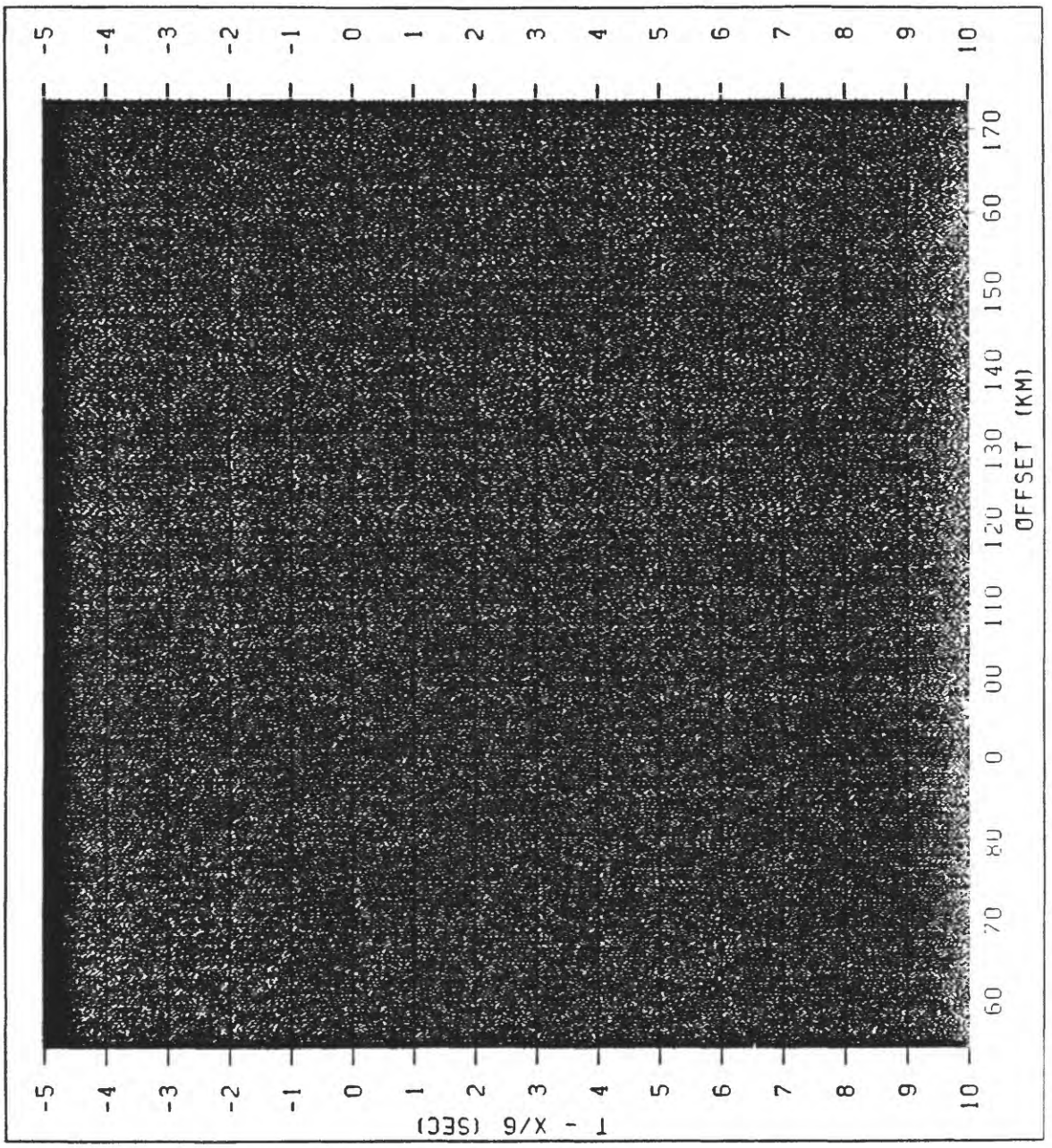


FIG. A-151. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 151
LINE 03 - GATHER 18 / STATION 6018

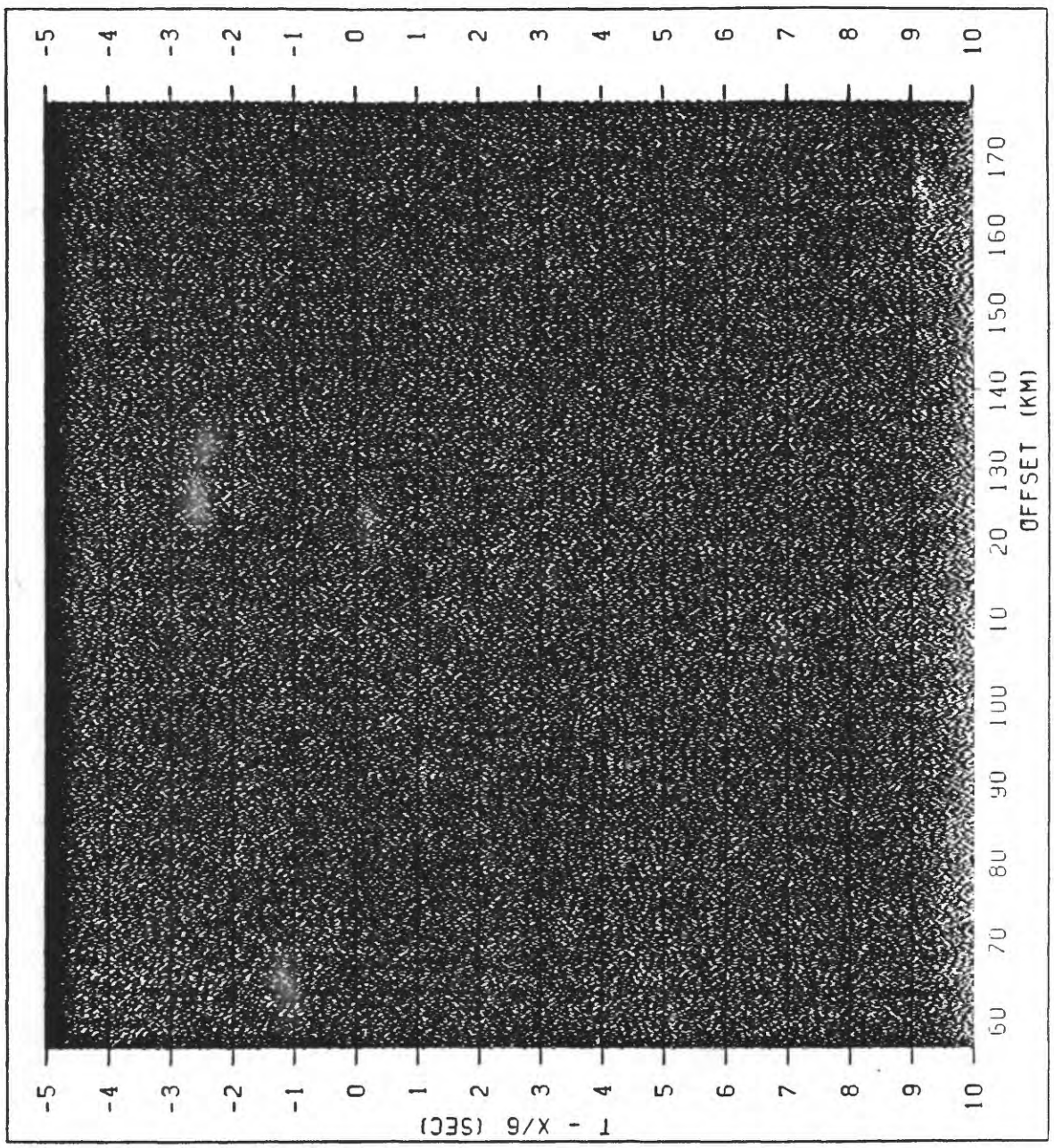


FIG. A-152. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 152
LINE 03 - GATHER 19 / STATION 6019

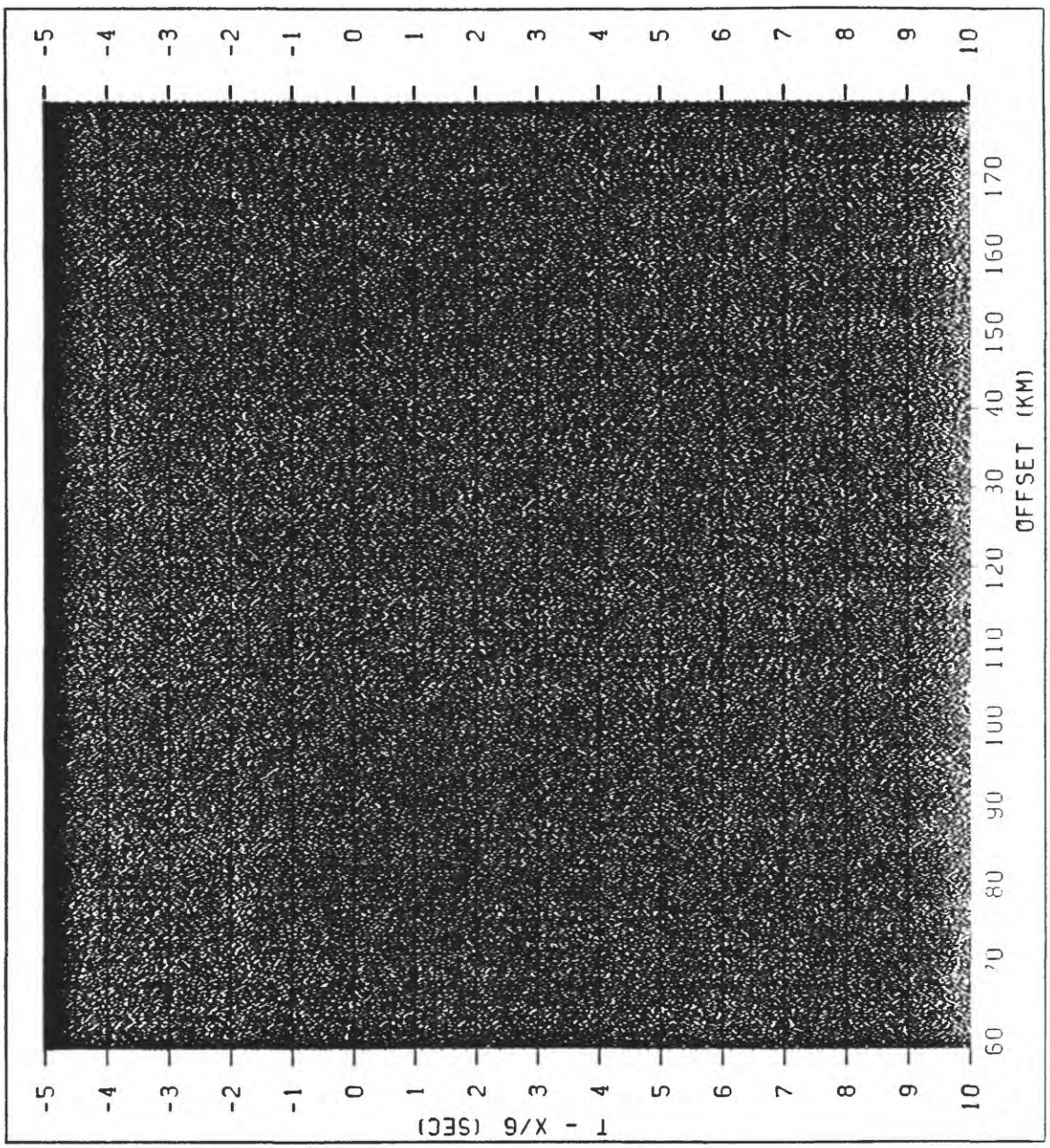


FIG. A-153. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 153
LINE 03 - GATHER 20 / STATION 6020

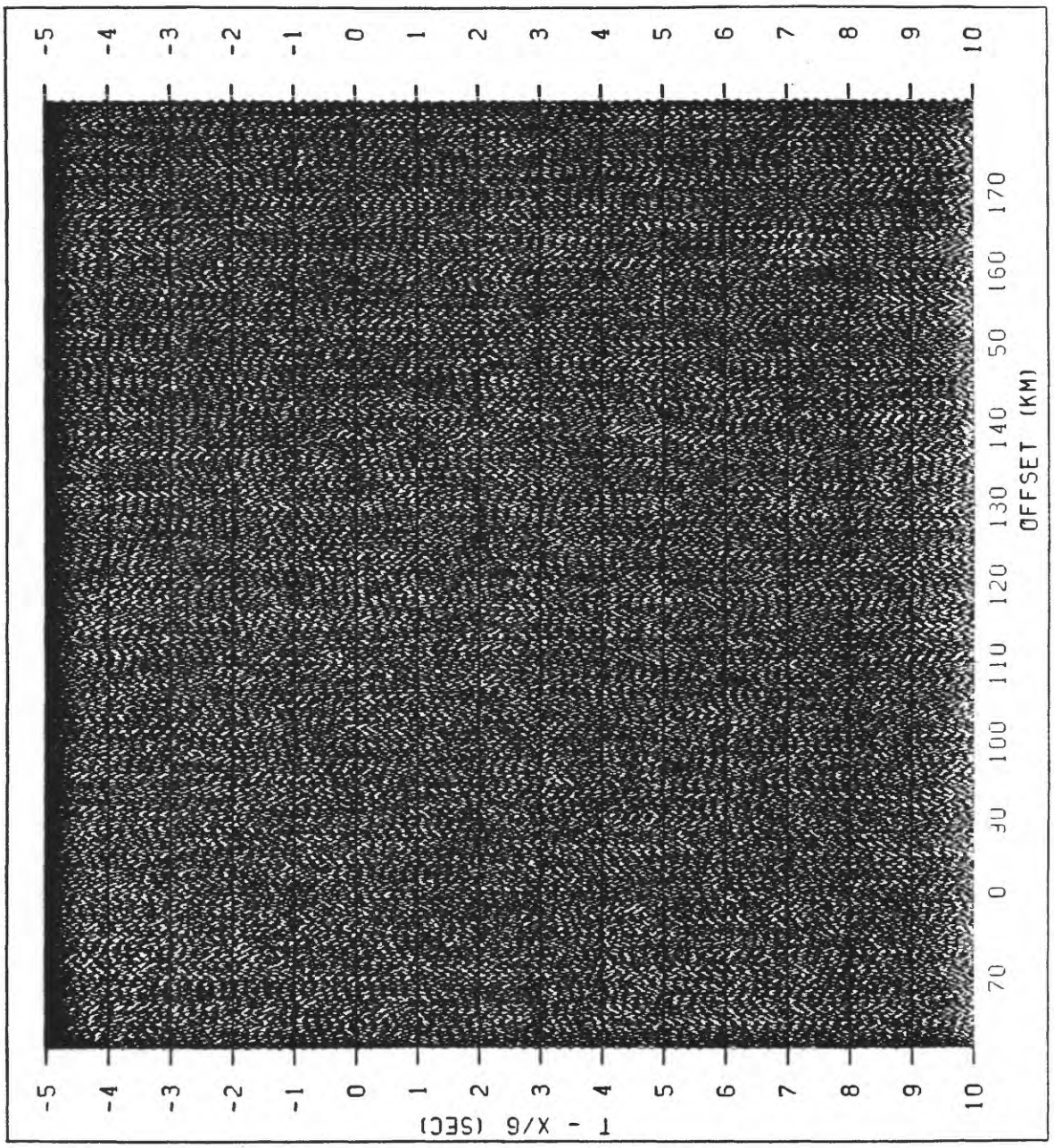


FIG. A-154. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 154
LINE 03 - GATHER 21 / STATION 6021

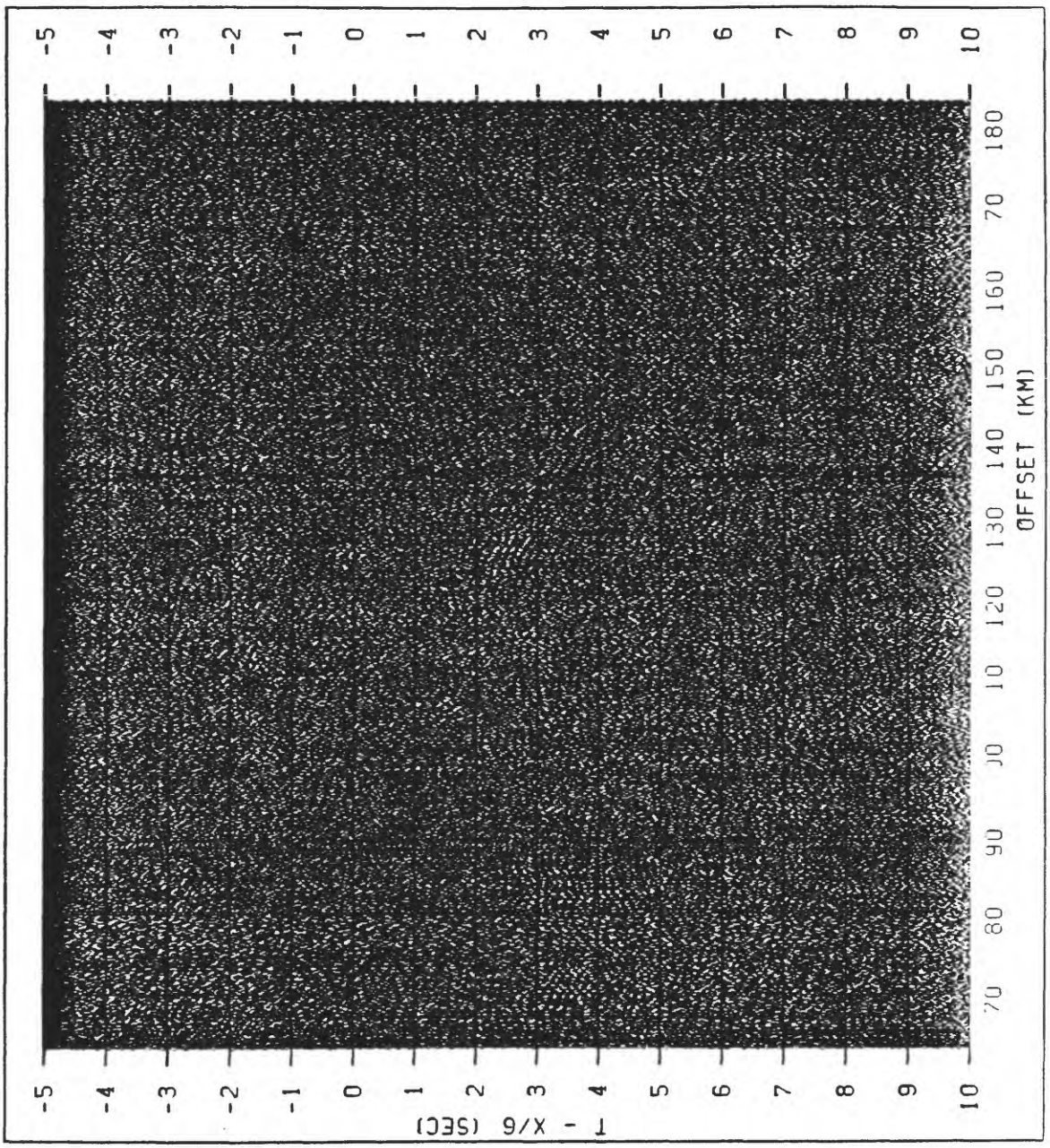


FIG. A-155. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 155
LINE 03 - GATHER 22 / STATION 6022

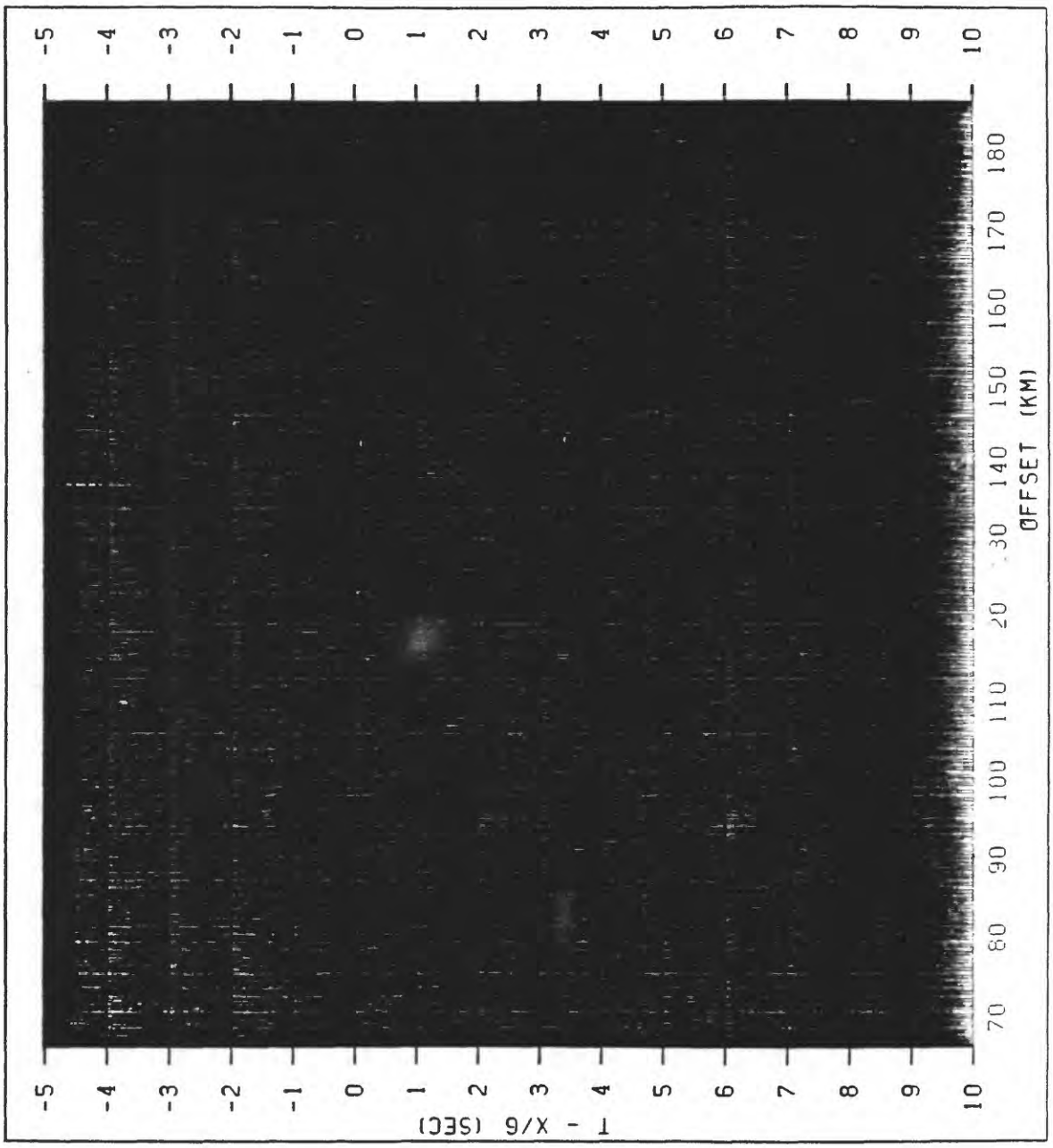


FIG. A-156. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 156
LINE 03 - GATHER 23 / STATION 6023

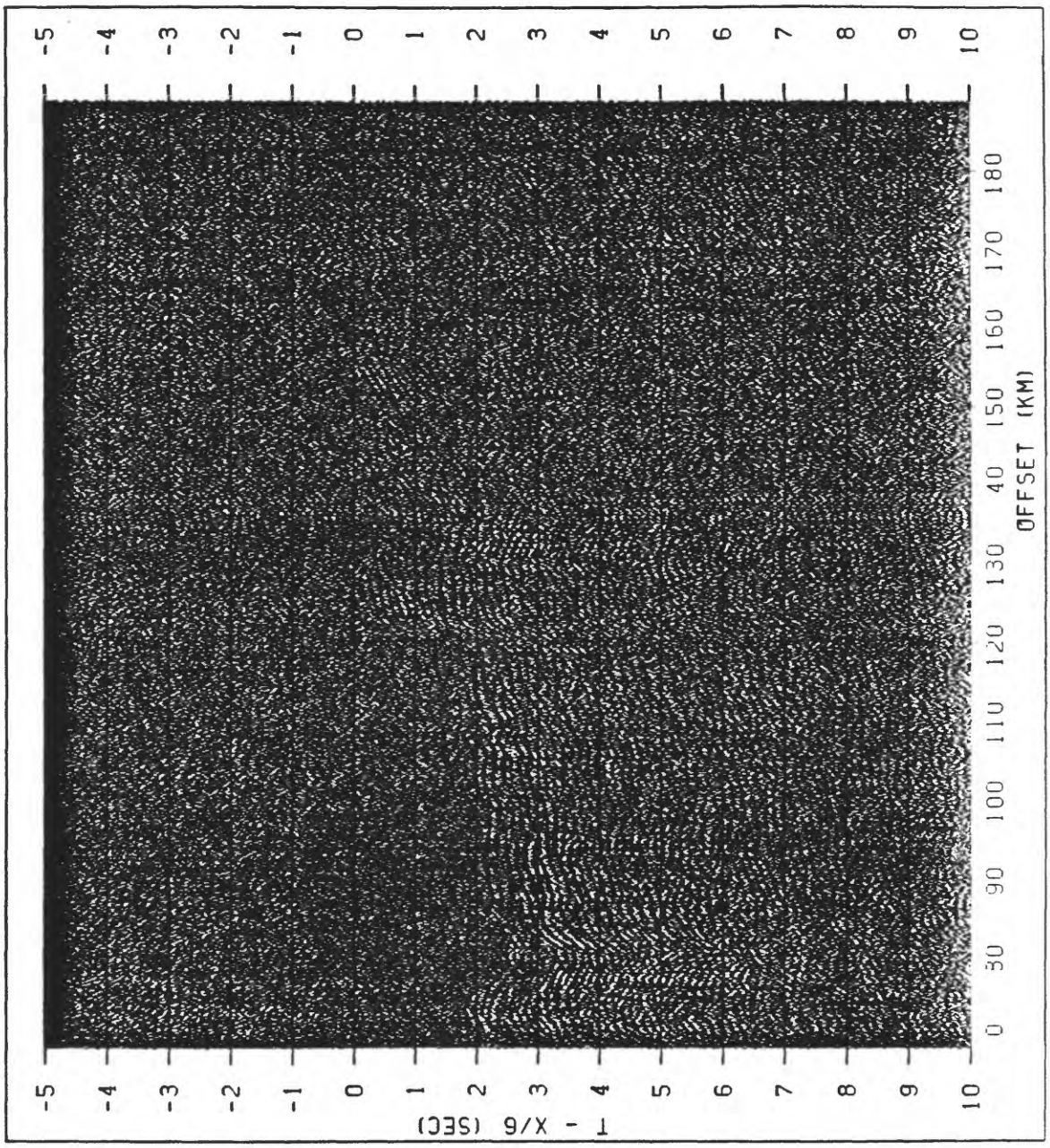


FIG. A-157. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 157
LINE 03 - GATHER 24 / STATION 6024

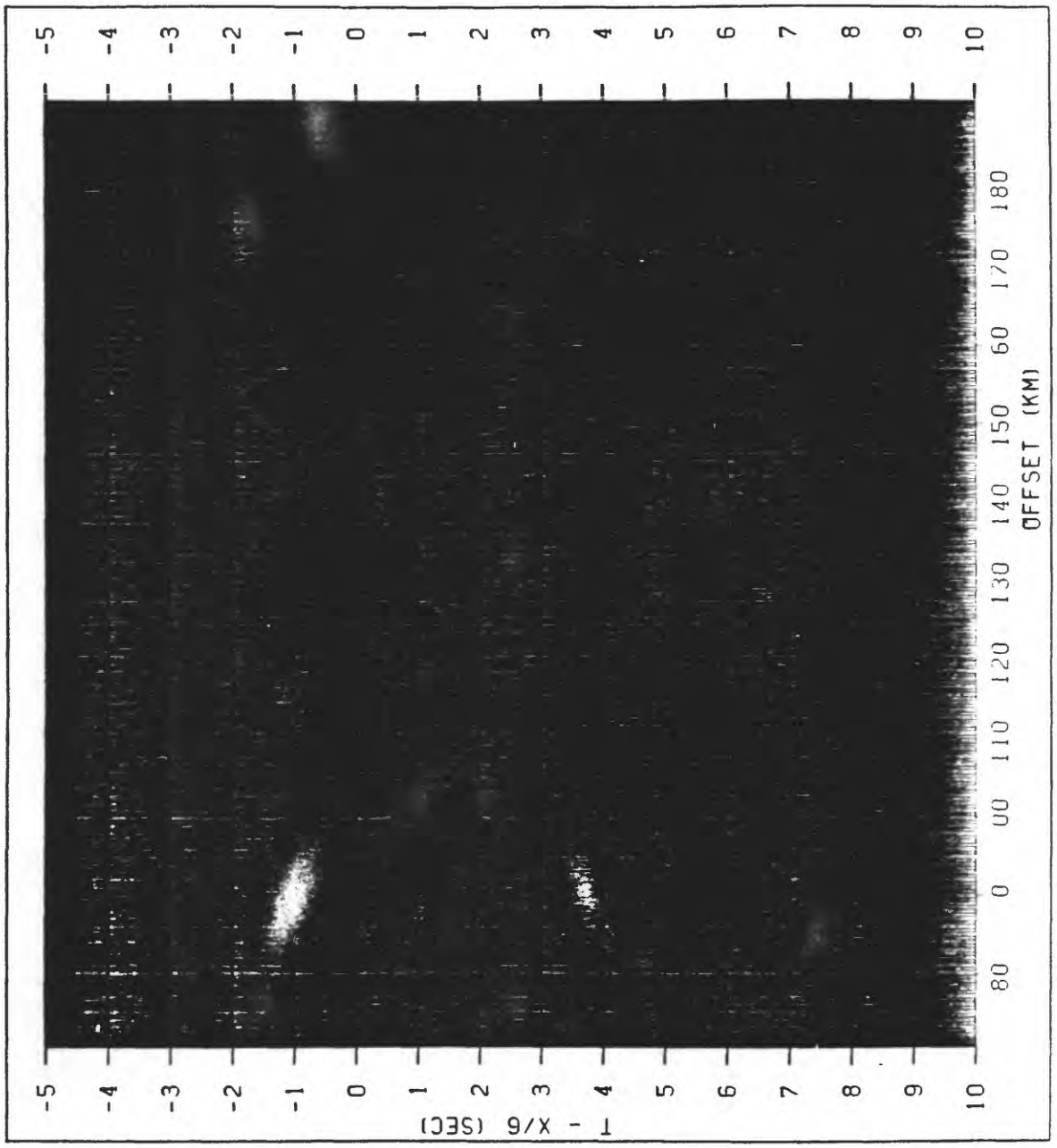


FIG. A-158. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 158
LINE 03 - GATHER 25 / STATION 6025

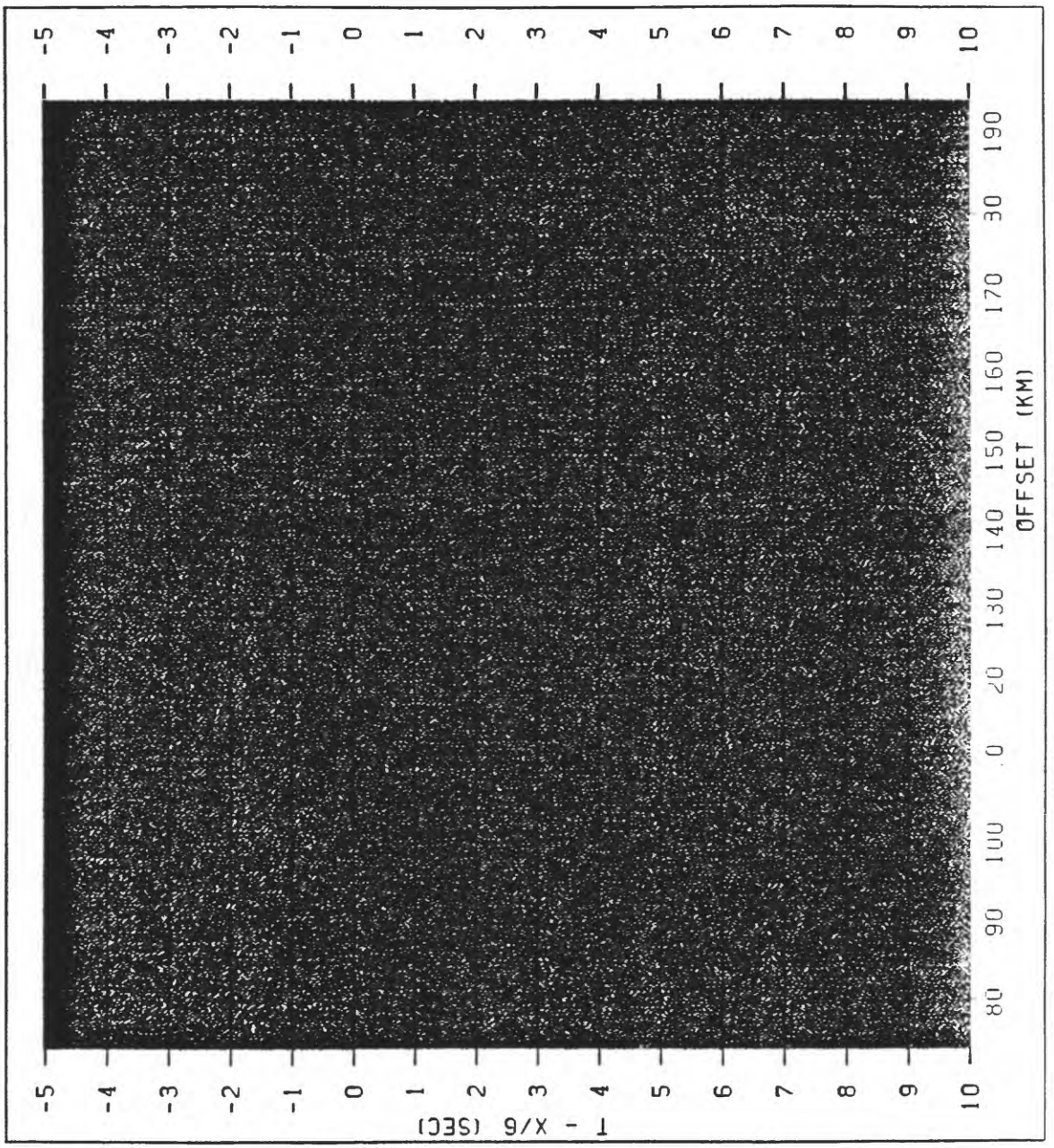


FIG. A-159. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 159
LINE 03 - GATHER 26 / STATION 6026

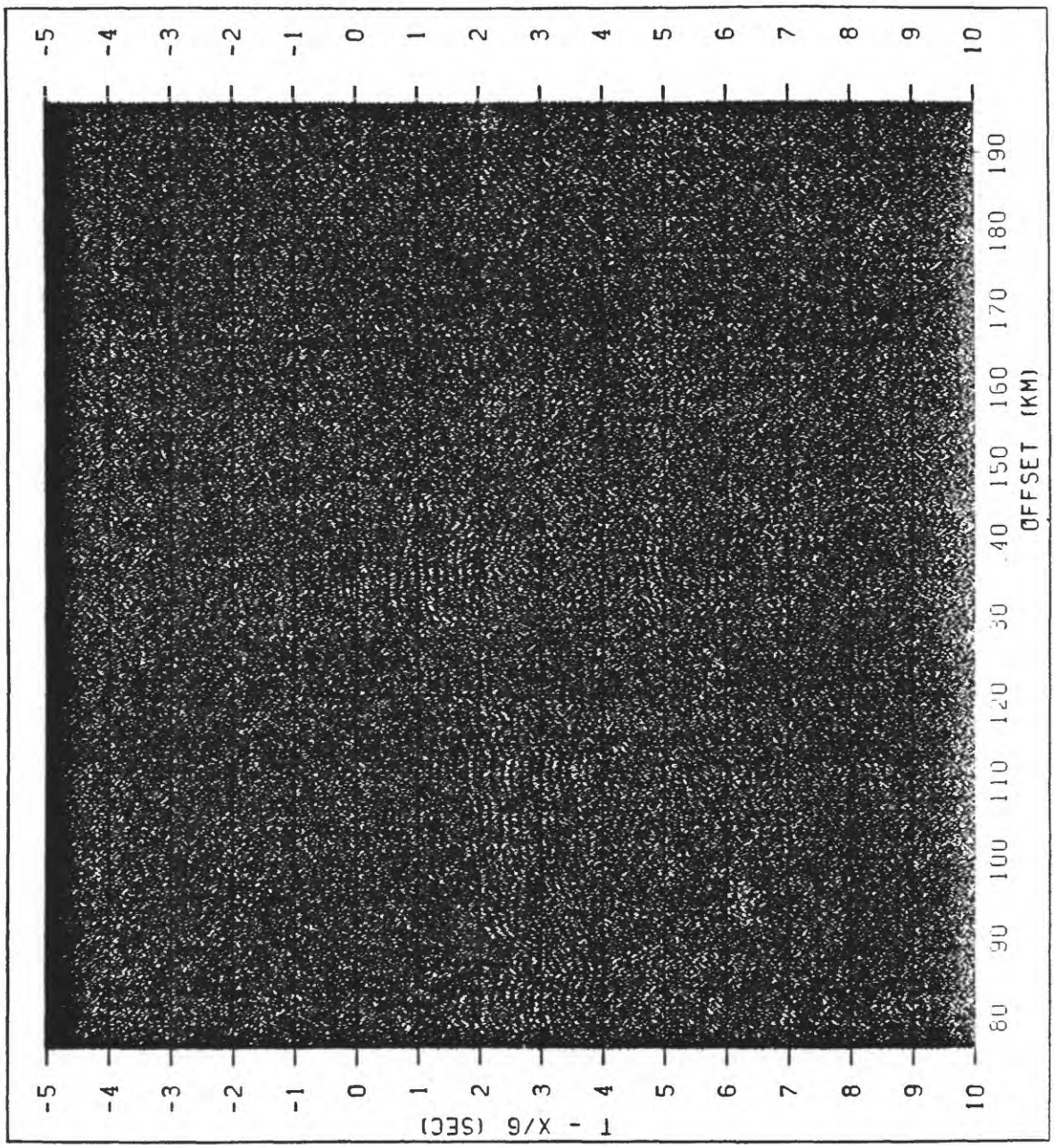


FIG. A-160. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 160
LINE 03 - GATHER 27 / STATION 6027

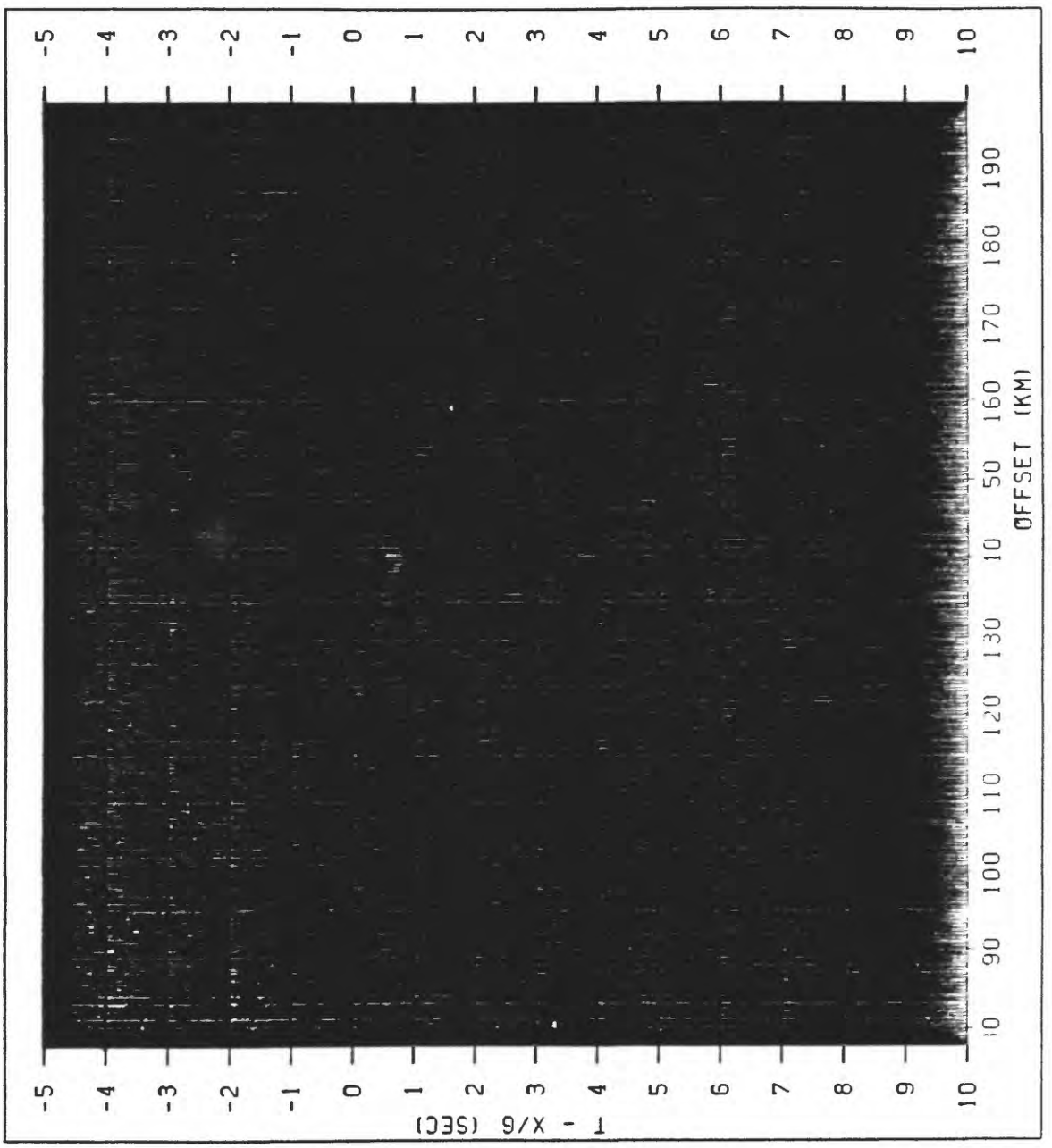


FIG. A-161. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 161
LINE 03 - GATHER 28 / STATION 6028

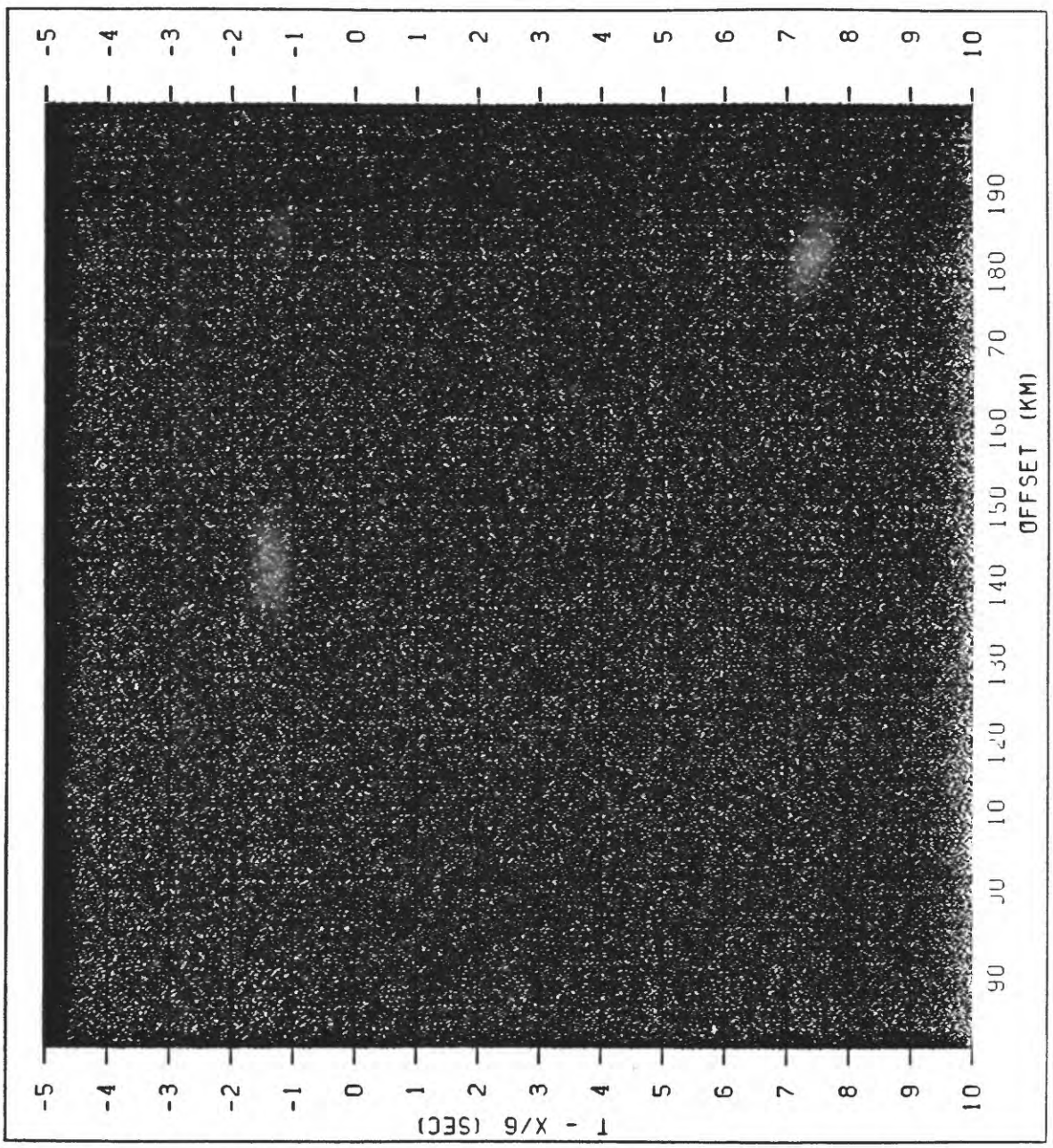


FIG. A-162. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 162
LINE 03 - GATHER 29 / STATION 6029

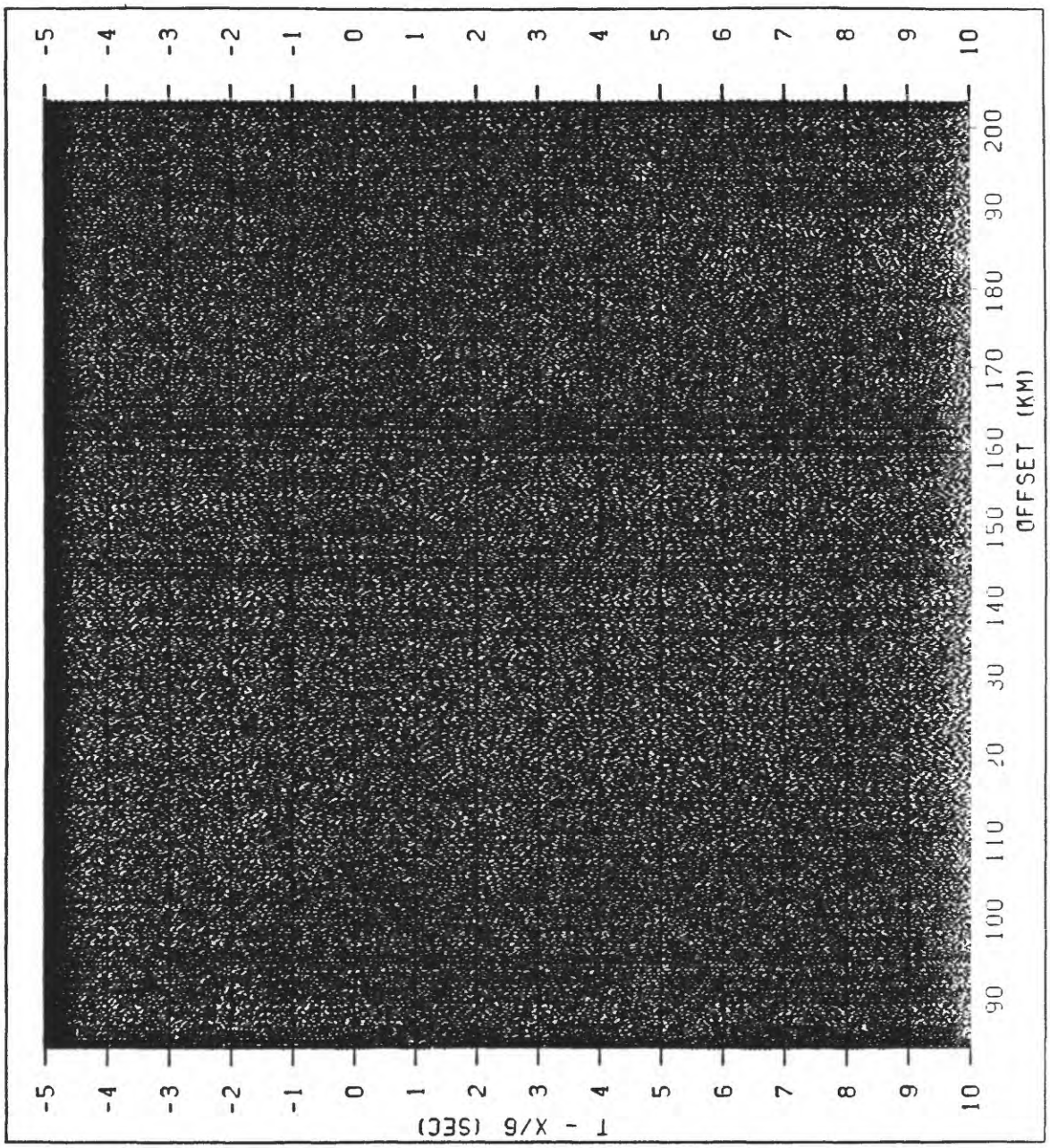


FIG. A-163. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 163
LINE 03 - GATHER 30 / STATION 6030

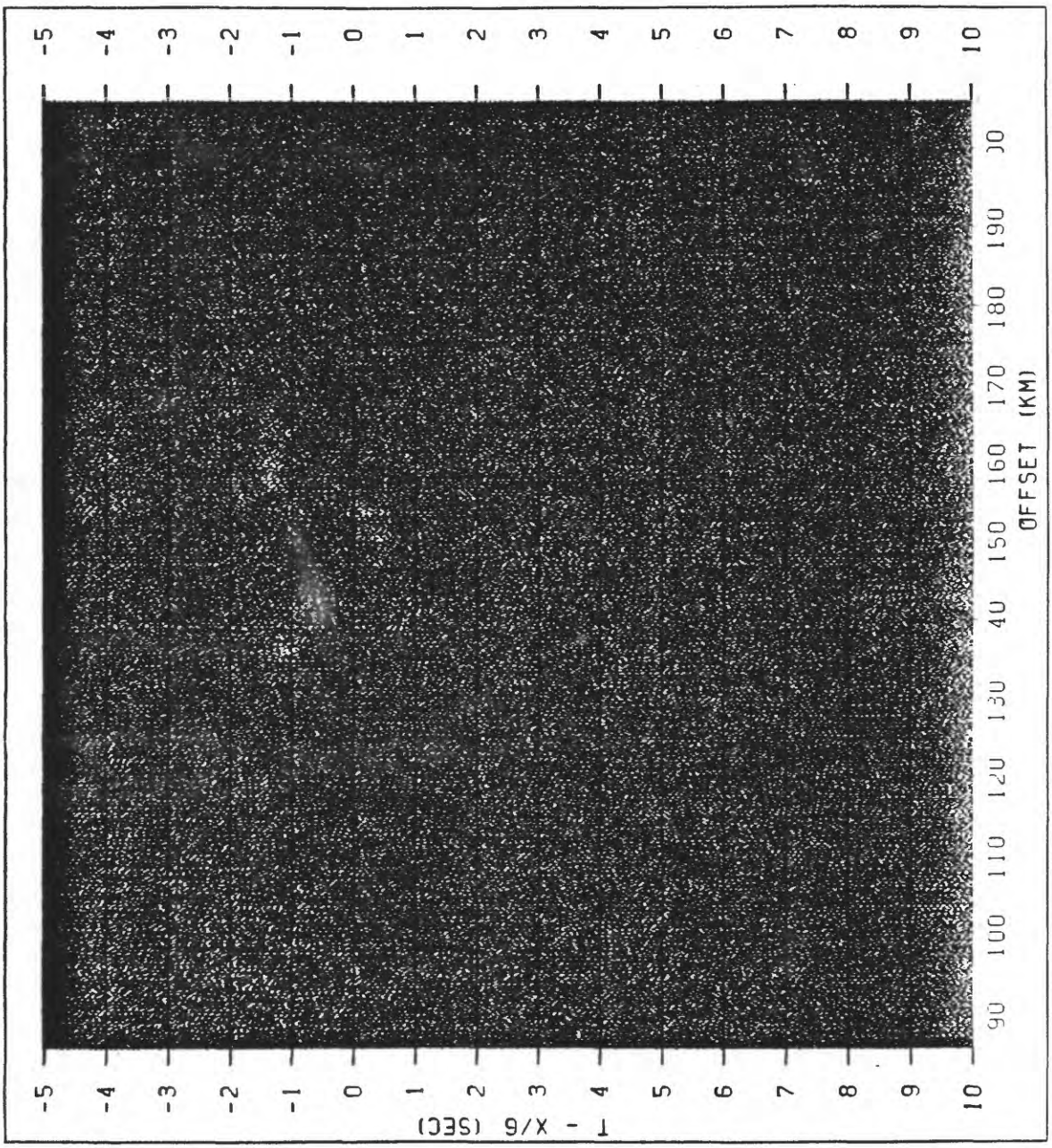


FIG. A-164. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 164
LINE 03 - GATHER 31 / STATION 6031

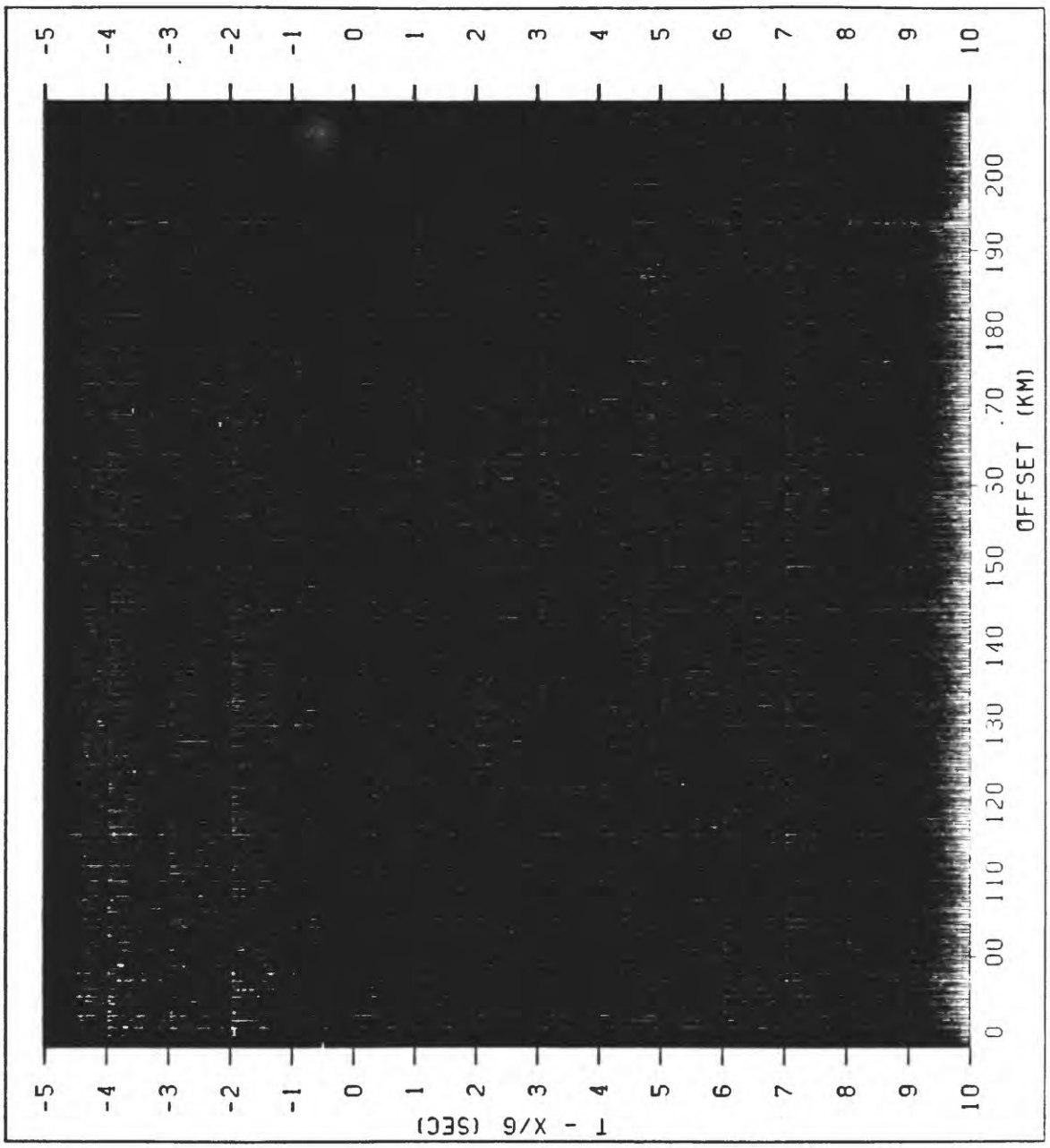


FIG. A-165. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 165
LINE 03 - GATHER 32 / STATION 6032

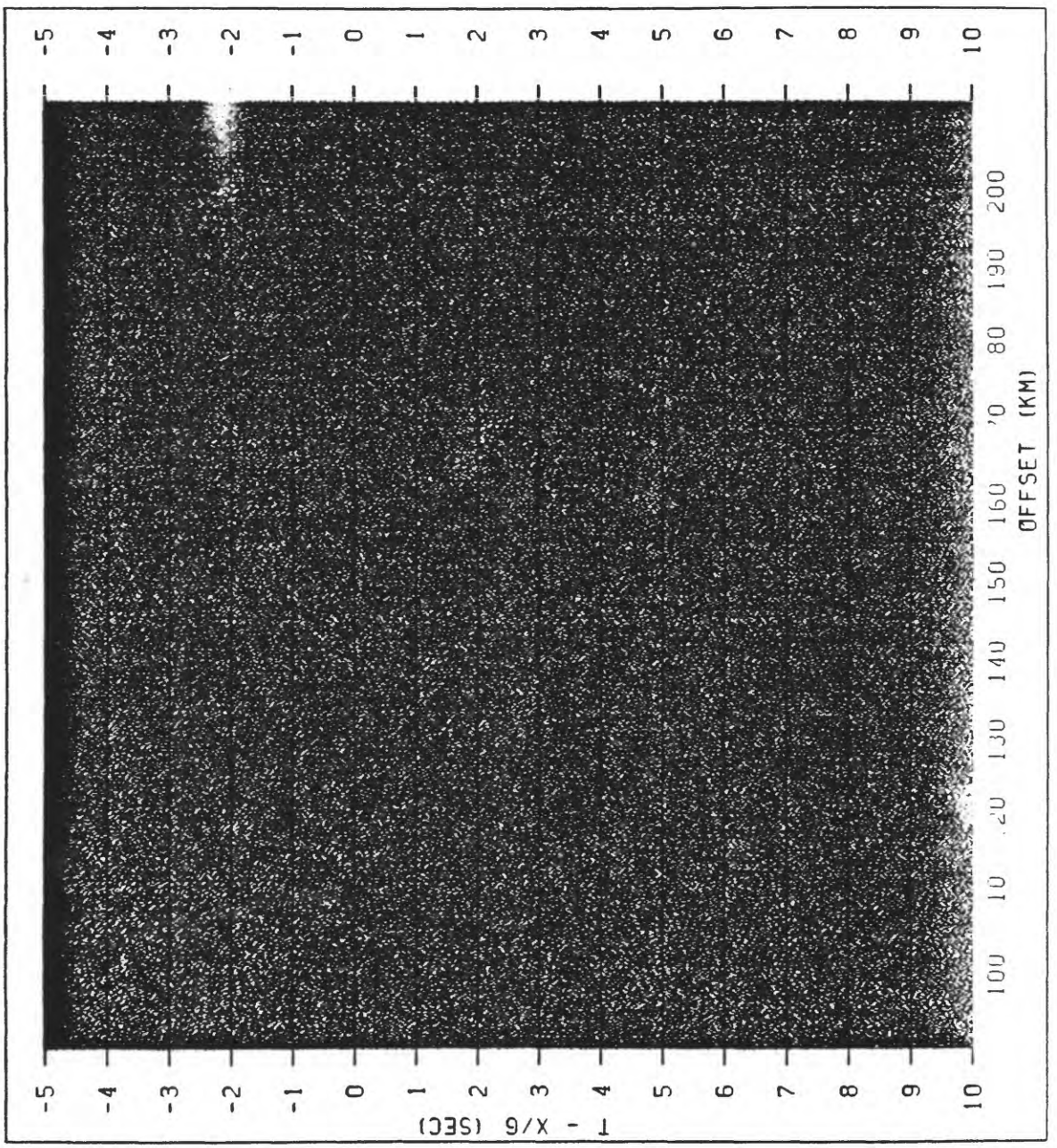


FIG. A-166. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 166
LINE 03 - GATHER 33 / STATION 6033

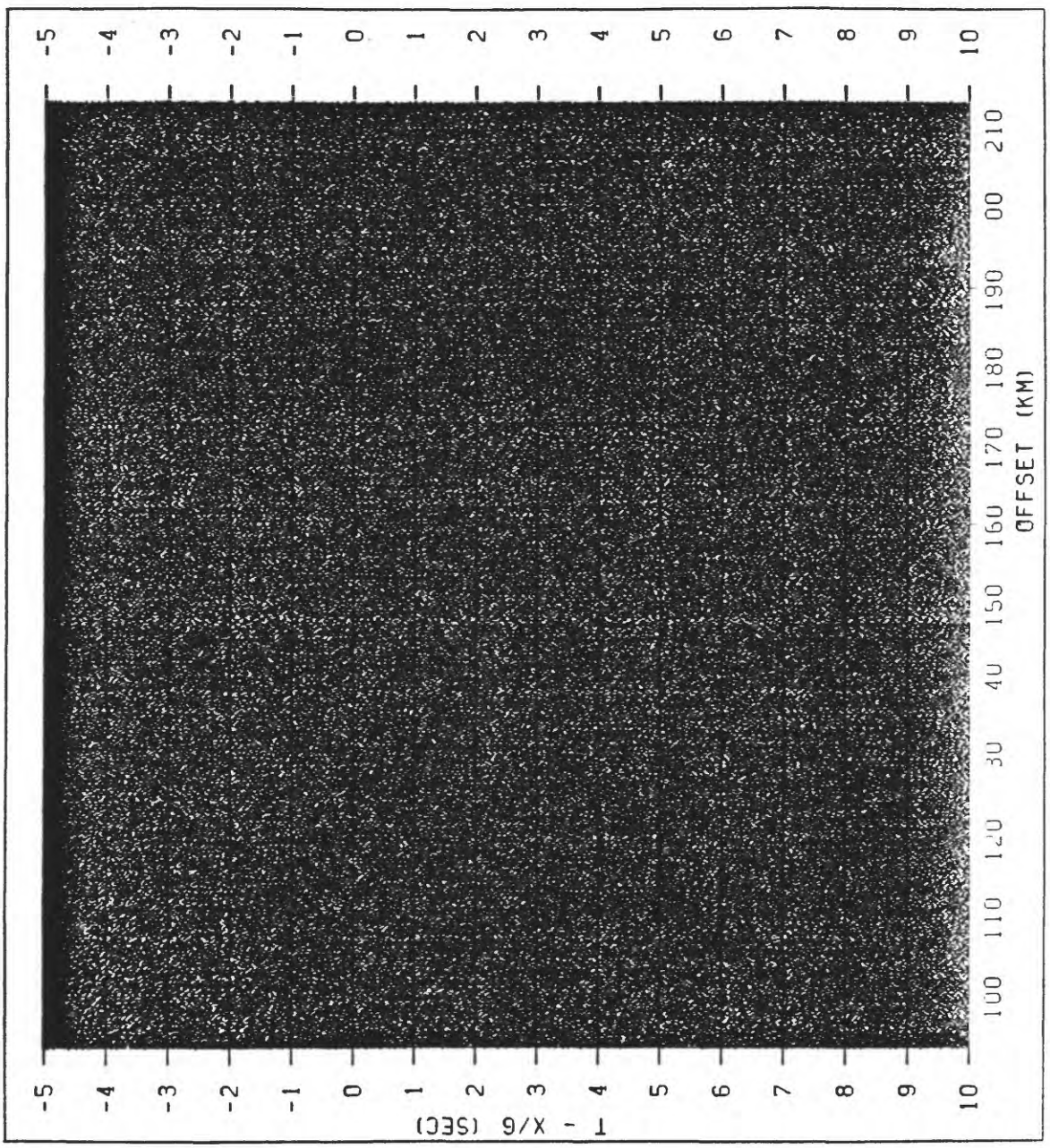


FIG. A-167. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 167
LINE 03 - GATHER 34 / STATION 6034

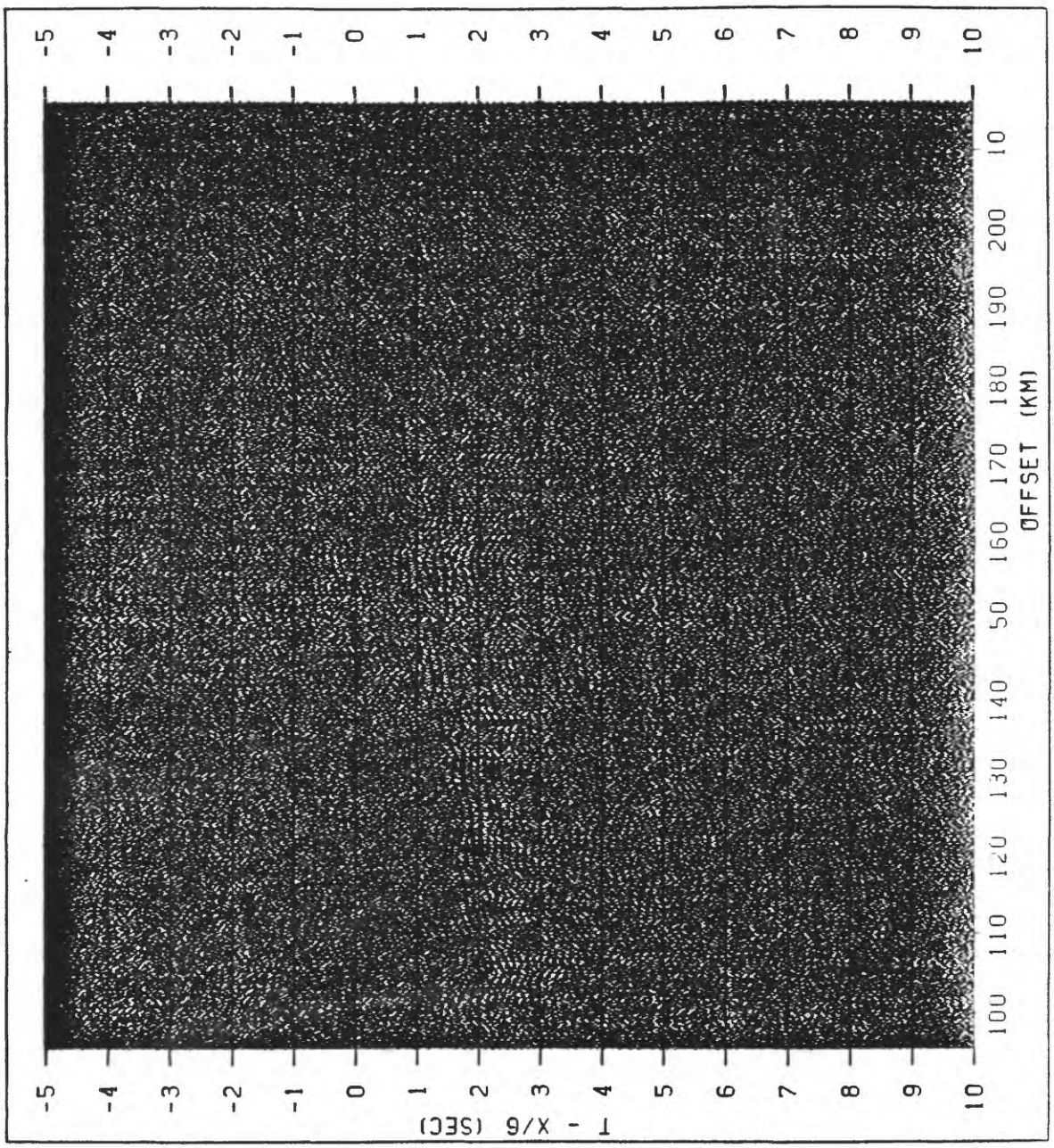


FIG. A-168. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 168
LINE 03 - GATHER 35 / STATION 6035

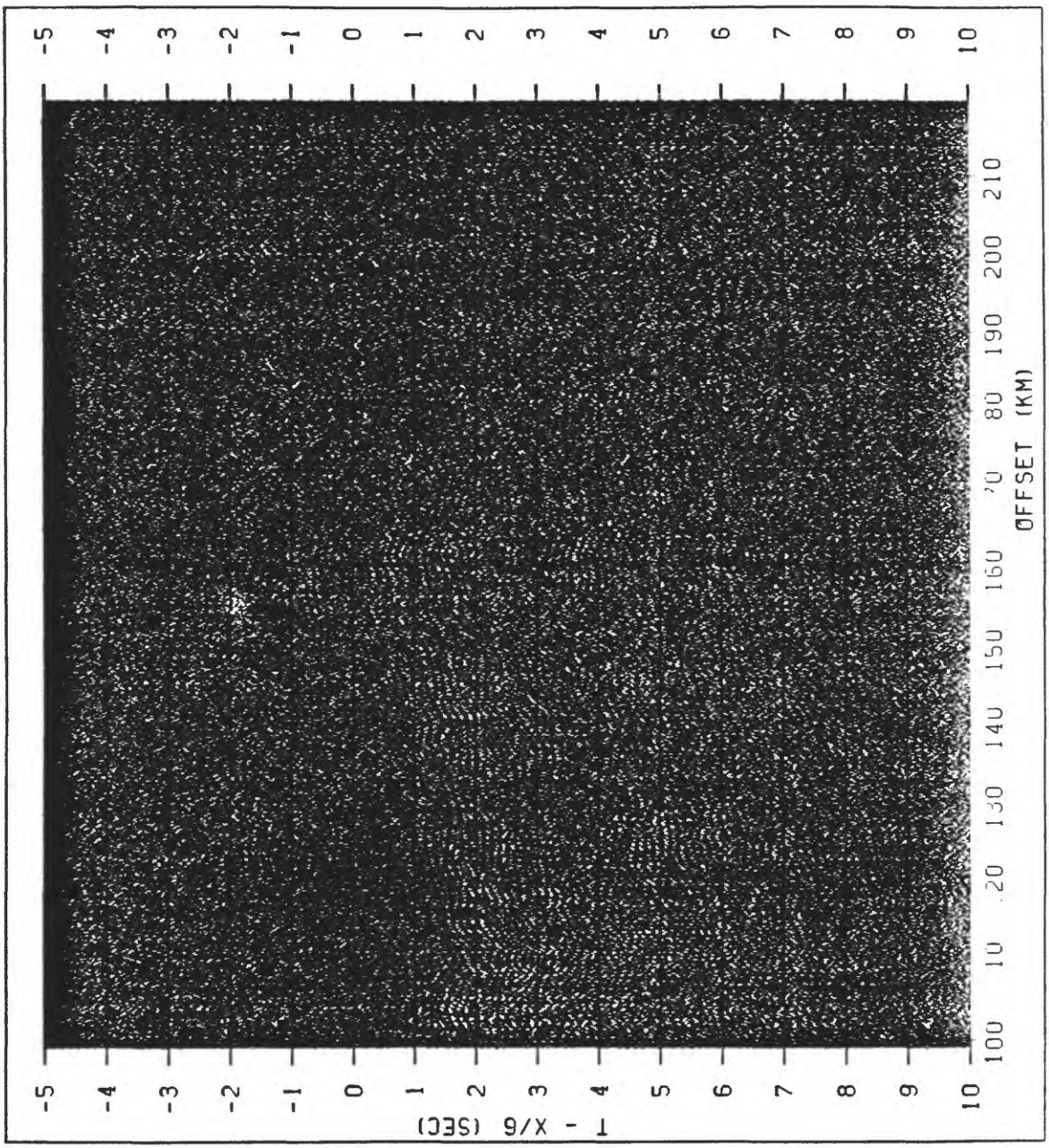


FIG. A-169. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 169
LINE 03 - GATHER 36 / STATION 6036

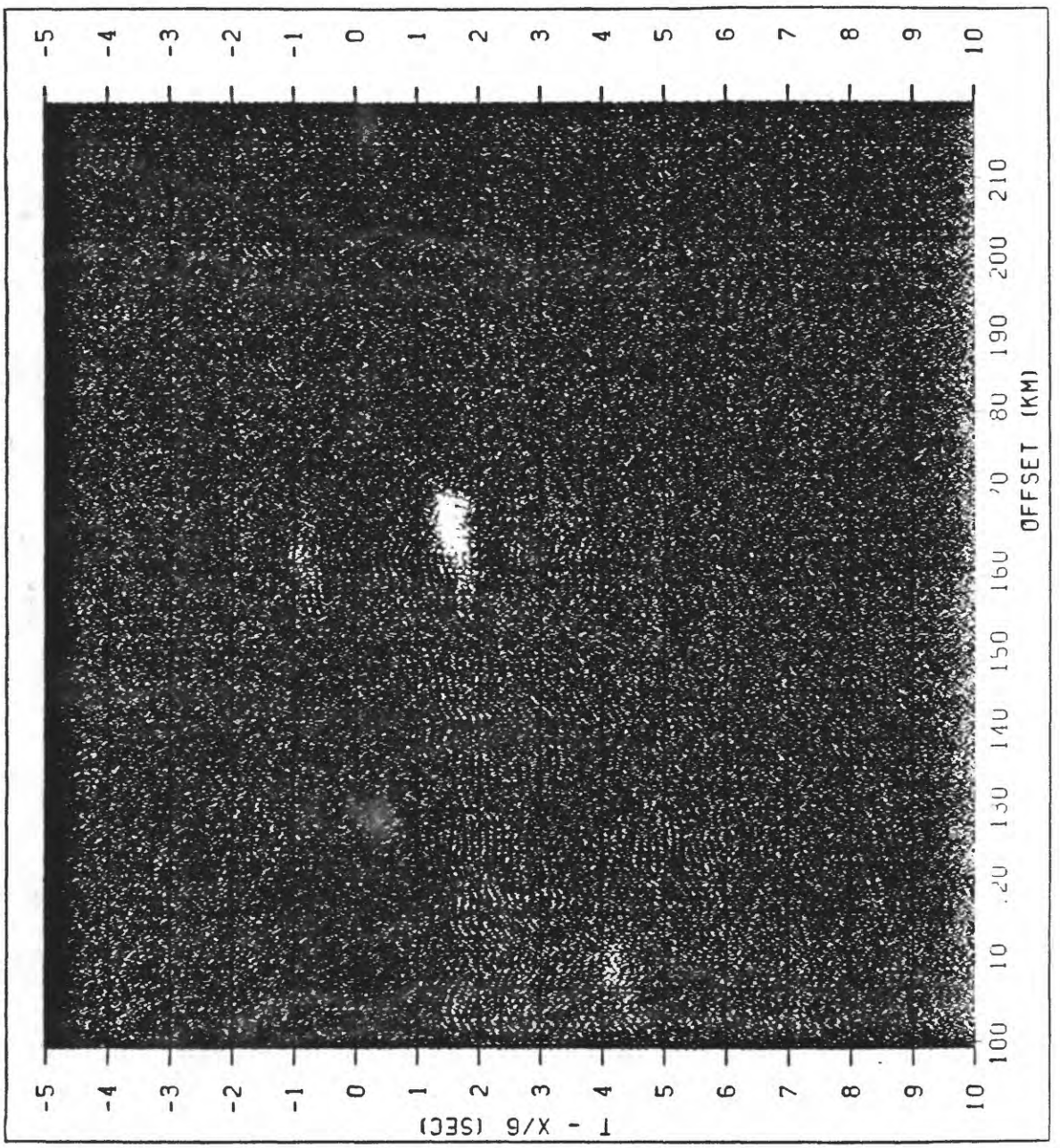


FIG. A-169. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 169
LINE 03 - GATHER 36 / STATION 6036

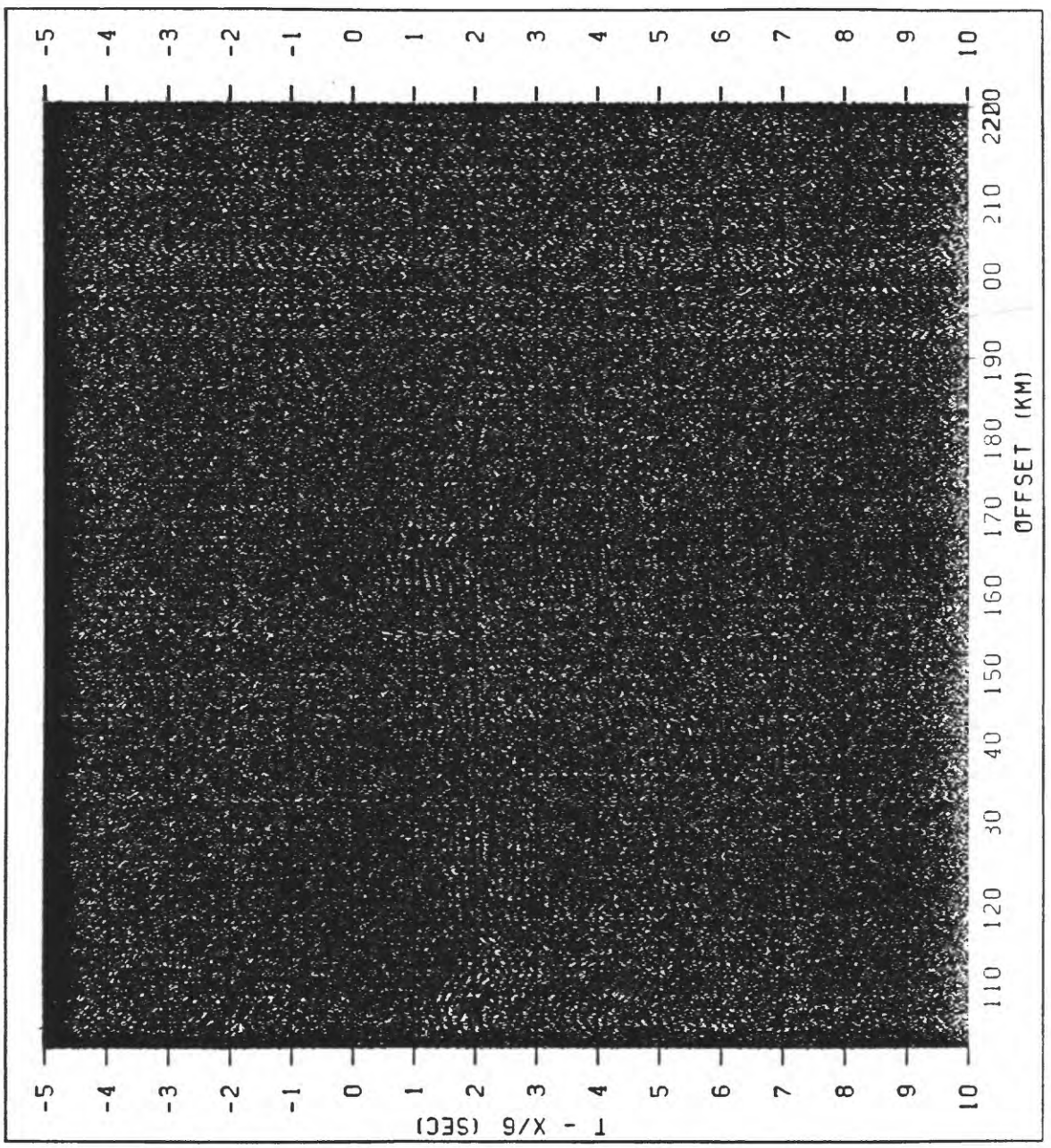


FIG. A-170. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 170
LINE 03 - GATHER 37 / STATION 6037

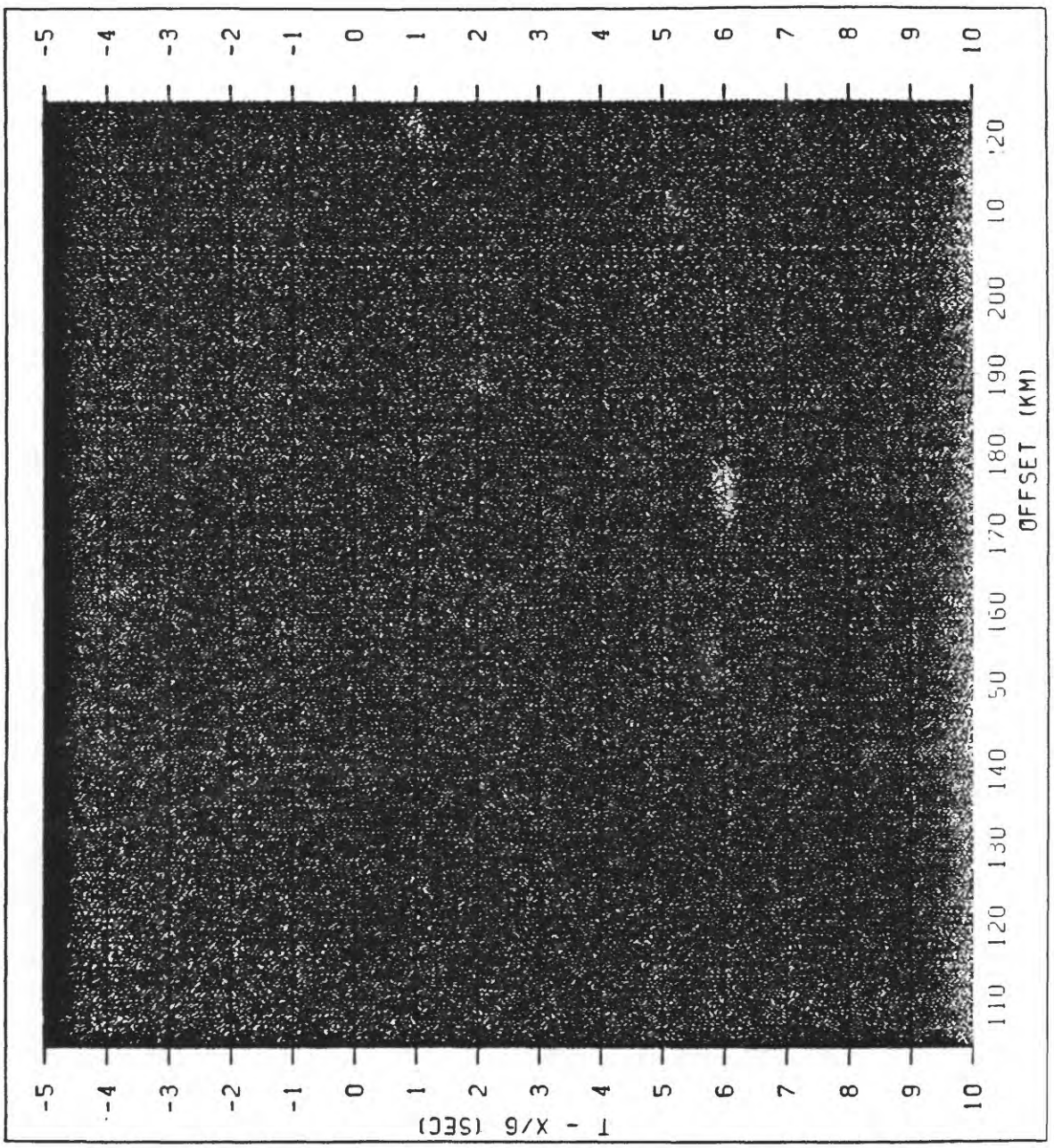


FIG. A-171. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 171
LINE 03 - GATHER 38 / STATION 6038

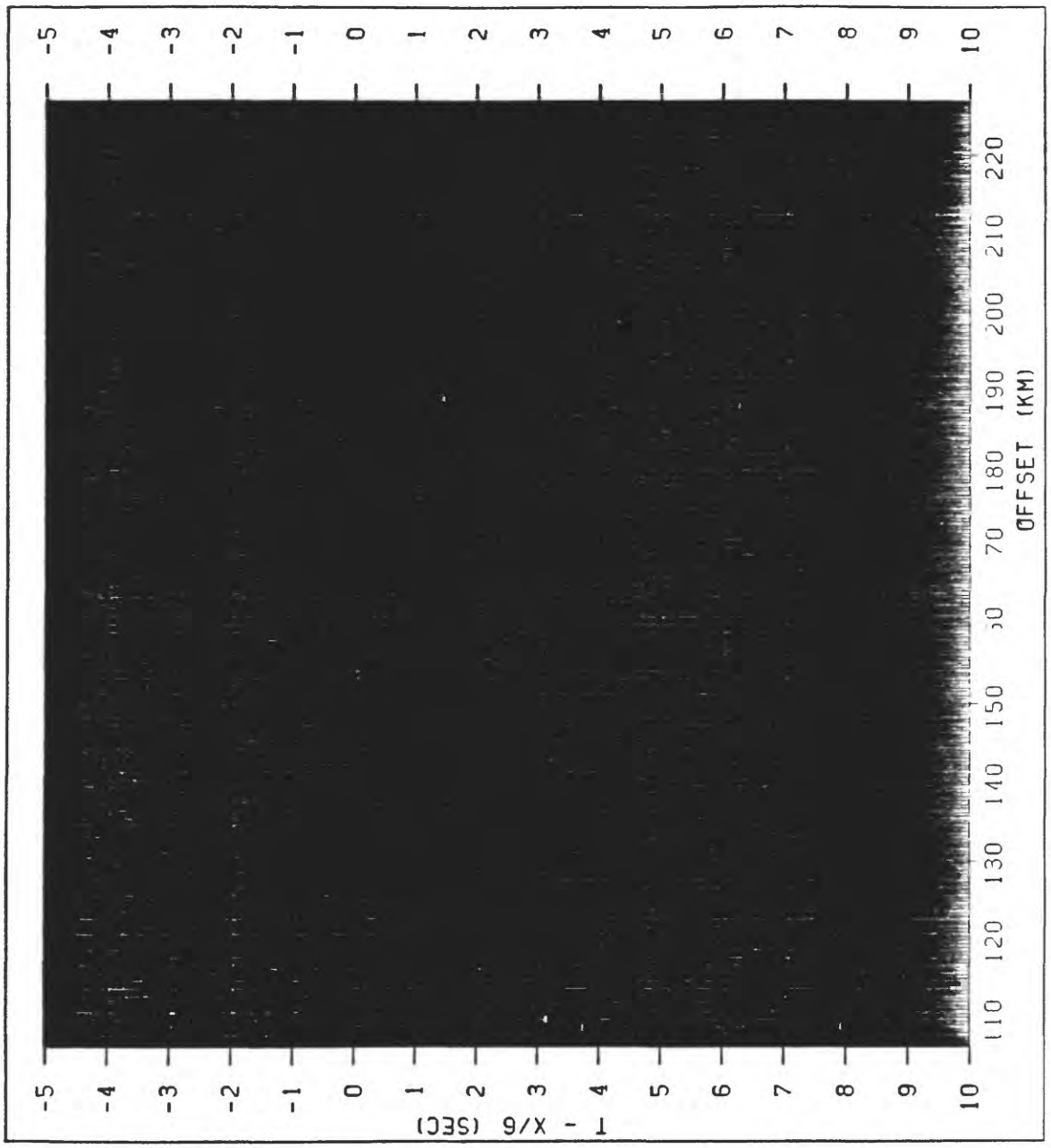


FIG. A-172. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 172
LINE 03 - GATHER 39 / STATION 6039

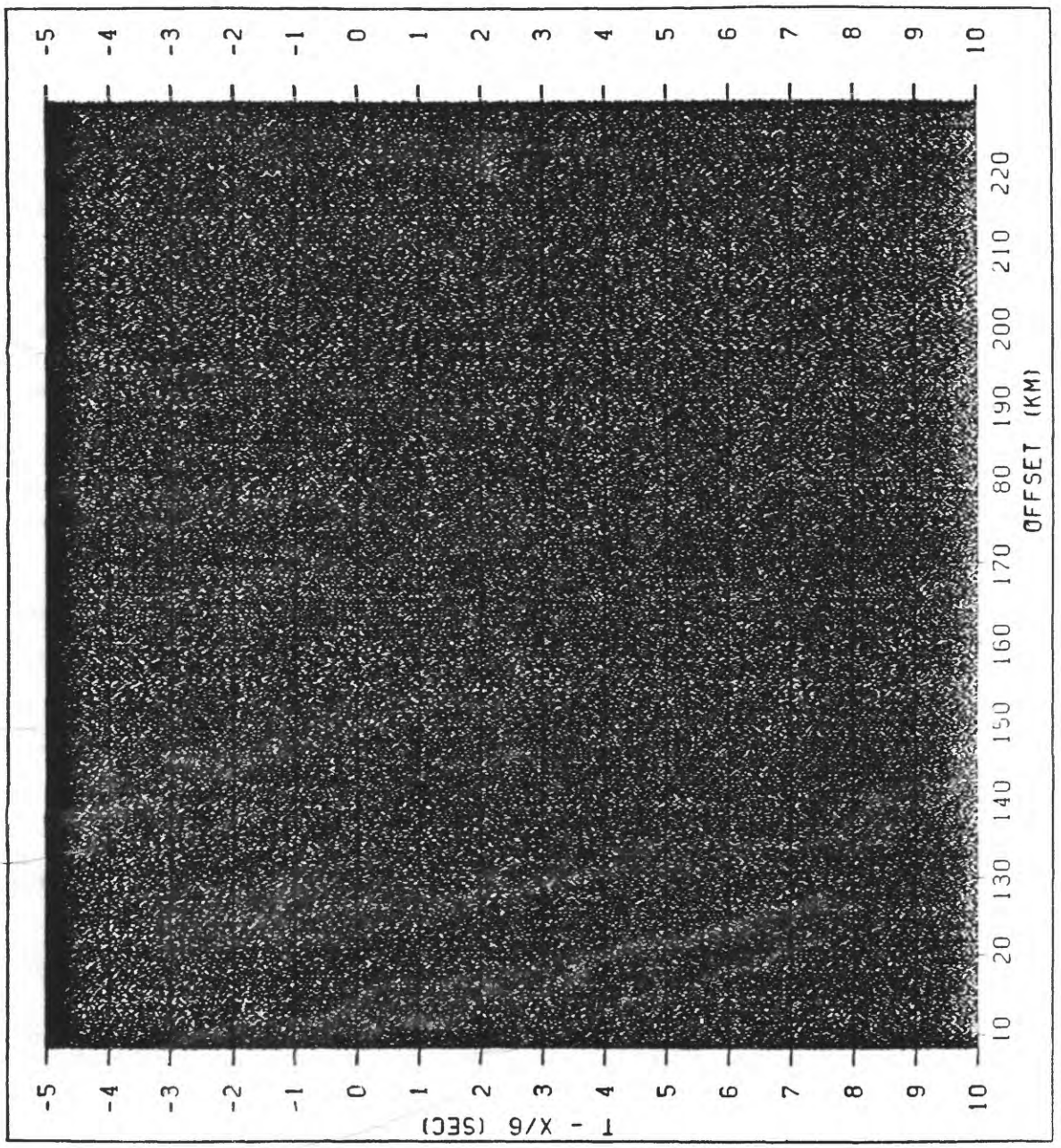


FIG. A-173. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 173
LINE 03 - GATHER 40 / STATION 6040

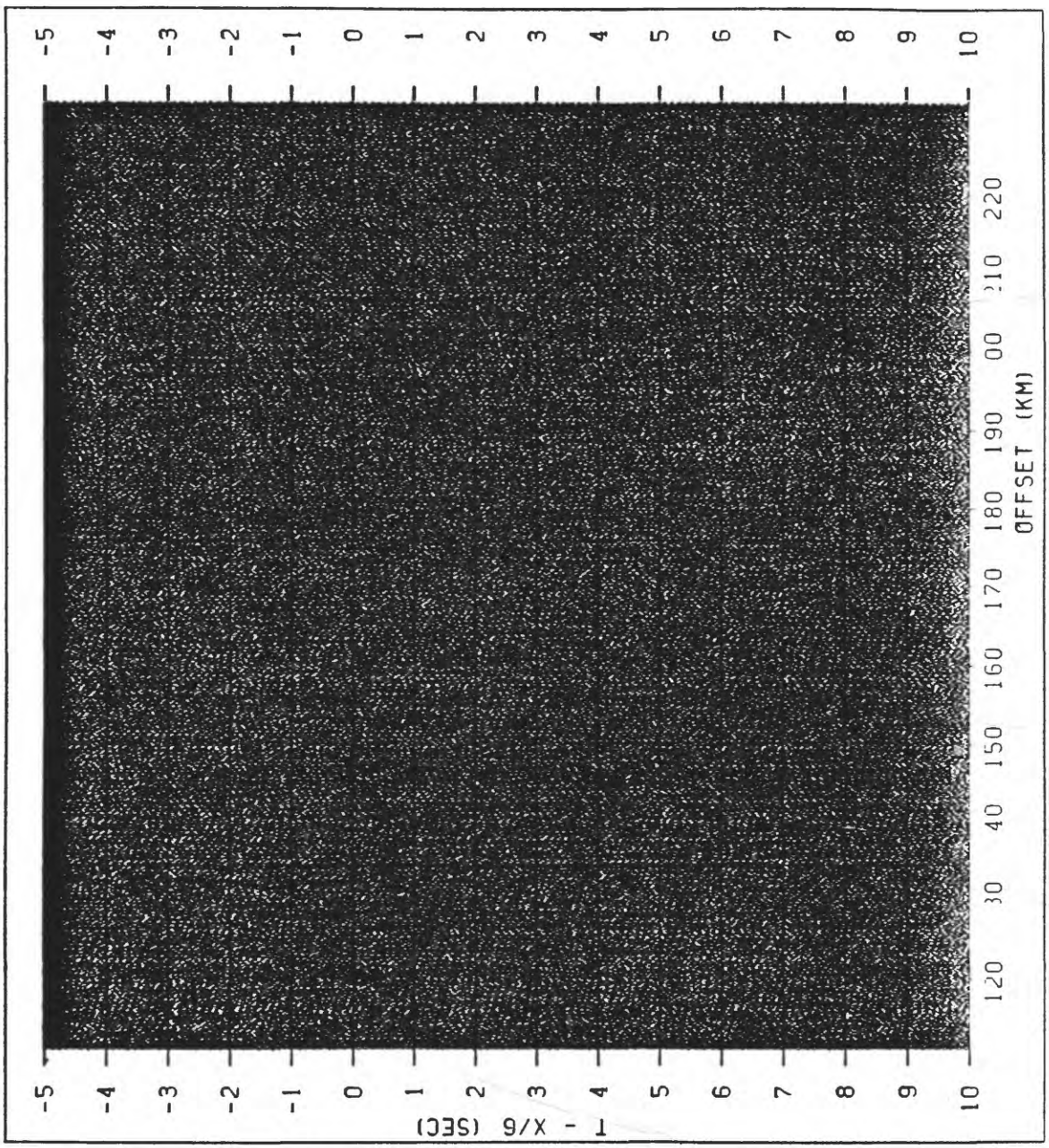


FIG. A-174. ONSHORE-OFFSHORE / 4-TRACE SUM
SHIP TRACK 06 / OVERALL GATHER 174
LINE 03 - GATHER 40 / STATION 6041