

United States
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Geological Survey

MULTICHANNEL SEISMIC-REFLECTION PROFILES COLLECTED
IN 1975, BETWEEN LATITUDES 34° AND 38° NORTH,
OFF THE CALIFORNIA COAST FROM PT. CONCEPTION TO PT. REYES

by

D. S. MCCULLOCH AND P. H. MCCLELLAN

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During November of 1975 the U.S. Geological Survey (USGS) collected approximately 860 km of 24-channel seismic-reflection data across the continental margin in the eastern Pacific Ocean off of the northern California coast (Plate 1). The data were collected on the USGS Research Vessel S. P. Lee (cruise identifier L3-75-NC) using a sound source of five airguns totalling 1,326 cubic inches at a manifold pressure of approximately 1,900 psi. The recording system consisted of a 24-group streamer, 2,400 meters long, and a GUS (Global Universal Science) model 4200 digital recording instrument. Records were sampled in the field at a 2-millisecond rate and later processed at a 4-millisecond rate. Navigational control for the survey was by satellite fixes augmented by Loran C (Rho-Rho) and doppler-sonar bottom-track navigation. Detailed navigation data were not recorded digitally at sea, so shot locations were later reconstructed from the seismic system operator's log. Plate 1 is a trackline chart showing shotpoint navigation.

The seismic reflection records vary in length from 5 to 9 seconds depending on water depth and geologic structure. The data have been edited, NMO-corrected, stacked, deconvolved, and filtered, and finally graphically displayed by an electrostatic plotter (Table 1). Processing was carried out at the USGS Marine Geology Seismic Processing Center in Menlo Park, California.

SHOT-POINT NUMBERING

Cruise L3-75-NC marks the beginning of the multichannel seismic-reflection program of the U.S. Geological Survey Branch of Pacific Marine Geology. This cruise was conducted before current USGS conventions of marine data acquisition were established. At that time, some field information (e.g., navigation control and field shot-point numbers) was recorded manually in the seismic system observer's log. The navigational data and field shot-point numbers for this cruise were subsequently keypunched into the USGS navigational data base, from which the accompanying shot-point map (Plate 1) was prepared. However, the seismic shot-points (and common-depth points) were renumbered during post-cruise processing according to a convention then established. The two systems of shot-point numbering, field vs. as-processed, may be cross-referenced as explained below.

The shot-point (SP) and common-depth-point (CDP) numbers used in processing were assigned at the time of demultiplexing on the basis of field-file (FFILE) number, which was recorded in the field both in the seismic trace header and in the observer's log. Hence, the FFILE numbers provide the link between the SP (and CDP) numbers assigned during processing and the original SP numbers defined in the field (those plotted in Plate 1). For this reason, the seismic-reflection

displays accompanying this report are annotated with both the processed CDP (= processed SP) number and the FFILE number. The FFILE numbers may be correlated with the field SP numbers and navigational data using the observer's log for this cruise, which is available on request from the U.S. Geological Survey Branch of Pacific Marine Geology. As a guide, the information on the side label of each seismic display indicates the first and last field shot points that correspond to the displayed CDP range.

DATA QUALITY

The quality of the seismic data for this cruise varies from good to poor, due to problems in data acquisition, data storage and subsequent processing.

Because of the early stage of development of the seismic acquisition system at the time of this survey, difficulties in data collection were experienced during this cruise. These difficulties included frequent shoaling of the hydrophone streamer, which introduced low-frequency "noise" into some of the data; contamination by transient, high-amplitude noise "spikes"; and occasional system failures, which interrupted the continuity of the seismic lines. Moreover, because the survey was conducted in late November, during the storm season along the California coast, the data quality was adversely affected by sea state. Extensive trace editing, therefore, was required. Additional loss of data has apparently occurred since the data were collected, due to tape deterioration or damage.

The end-user of the demultiplexed and stacked data tapes, therefore, should be advised that the digital seismic data from this cruise may require significant data editing, and that portions of the data may be incomplete or unreadable. Data gaps, where due to on-board system failures, are annotated as such on the seismic displays.

DATA FORMATS

The seismic data are available in three formats:

1. Electrostatically plotted profiles which were deconvolved and filtered after stacking. Copies of the profiles may be purchased through:

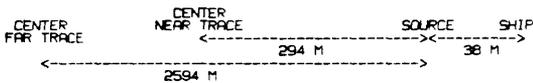
National Geophysical Data Center
National Oceanic and Atmospheric Administration
Boulder, Colorado 80302

2. Digital magnetic stack tapes. Copies of the stack tapes and a description of the tape format can be obtained at the requester's expense by contacting:

Data Curator
Branch of Pacific Marine Geology
U.S. Geological Survey, MS 999
345 Middlefield Road
Menlo Park, California 94025

3. Digital magnetic demultiplexed tapes. Copies of the demultiplexed tapes and a description of the tape format can be obtained at the requester's expense by contacting the USGS at the above address.

RECORDING PARAMETERS

DATE RECORDED: 11/75
 SOURCE : BOLT AIR GUNS
 AIR GUNS IN ARRAY: 5
 NET VOLUME: 1326 CU. IN.
 MANIFOLD PRESSURE: 1900 PSI
 GUN DEPTH: 8.5 M
 SHOT SPACING: 50 M
 STREAMER: SEI MULTIDYNE. CHARGE COUPLED
 GEOMETRY:


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    CENTER FAR TRACE  ←----- 2594 M ----->
                                ←----- 294 M ----->
                                CENTER NEAR TRACE
                                ←----- 38 M ----->
                                SOURCE SHIP
    
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 GROUP INTERVAL: 100 M
 AVERAGE DEPTH: 15 M
 GROUP LENGTH: 100 M
 PHONES/GROUP: 60
 DEPTH CONTROLLERS: SEI VARIABLE WING BIRDS
 RECORDING: GUS HDRR 4200, BINARY GAIN
 SAMPLE INTERVAL: 2 MS
 RECORD LENGTH: 5 S
 GUS RECORDING FILTER: 5-110 HZ
 NUMBER OF CHANNELS: 24
 NAVIGATION: MARCONI INTEGRATED SYSTEM
 SHOT ON: DISTANCE
 PRIMARY NAVIGATION: SATELLITE, LORAN C
 DIRECTION RECORDED: NW

PROCESSING SEQUENCE

DATE PROCESSED: 12/86
 1 DEMULTIPLEX
 DESAMPLE: 4 MS
 GAIN RECOVERY:
 REFORMAT: PHOENIX 1
 2 TRACE SHOT EDIT
 3 STATIC CORRECTIONS
 RECORDING STATICS: 20 MS
 DATAUM: SEA LEVEL
 4 COP SORT
 5 VELOCITY ANALYSIS: CONST. VEL. GATHERS
 VELOCITY FUNCTIONS: 5
 BAND PASS FILTER: 3-6-40-50 HZ
 VELOCITY RANGE: 1400-3500 M/S
 6 NMO CORRECTION
 7 24-FOLD STACK: NORMALIZED WEIGHTING
 8 TIME-VARYING BP FILTER
 TAPER: HANNING
 FILTER POINTS: 101

TIME WINDOWS (SUB-SEAFLOOR)	PASS-BAND
0.0 - 800.0	7-12-45-55 HZ
1000.0 - 1800.0	6-11-40-50 HZ
2000.0 - 2800.0	5-10-35-45 HZ
3000.0 - 3800.0	5-10-30-40 HZ
4000.0 - 5000.0	5-10-25-35 HZ

 9 SPIKING DECONVOLUTION
 DESIGN WINDOW: 2000 MS
 OPERATOR: 300 MS
 WHITE NOISE ADDED: 60 PERCENT
 10 AGC WINDOW: 500 MS

PLOT PARAMETERS

MODE: VARIABLE AREA/WIGGLE TRACE
 HORIZONTAL SCALE: 20 TR/IN
 VERTICAL SCALE: 1.75 IN/S
 CLIP: 2.0 TRACE WIDTHS
 GAIN: 1.0 (SCALAR)