

United States  
Department of the Interior  
Geological Survey

MULTICHANNEL SEISMIC-REFLECTION PROFILES COLLECTED  
IN 1980 OFF OF THE WASHINGTON AND NORTHERN OREGON COAST

by

P. H. MCCLELLAN AND P. D. SNAVELY, JR.

U.S. Geological Survey  
OPEN-FILE REPORT  
88-205

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1988

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In October of 1980 the U.S. Geological Survey (USGS) collected approximately 1,063 km of 12-channel seismic-reflection data in the northeastern Pacific Ocean off of the Washington and northern Oregon coast (Plate 1). The data were collected on the USGS Research Vessel S. P. Lee (cruise identifier L11-80-W0) using a sound source of five airguns totalling 1,212 cubic inches at a manifold pressure of approximately 1,900 psi. The recording system consisted of a 12-group streamer, 600 meters long, and a GUS (Global Universal Science) model 4200 digital recording instrument. Shots were fired every 50 meters, and 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.

Record lengths vary from 8 to 10 seconds, depending on water depth, in order to obtain 6 to 8 seconds of data below the seafloor. The stacked data have been edited, deconvolved, and filtered, and finally displayed by an electrostatic plotter (Table 1). Plate 1 is a trackline chart showing shotpoint navigation. Processing was conducted at the USGS Marine Geology Seismic Processing Center in Menlo Park, California.

#### STREAMER CONFIGURATION

Unlike other multichannel seismic-reflection surveys conducted by the USGS, this survey was conducted with an exceptional streamer hydrophone array. Due to rough seas, only 600 meters of the 2400-meter-long multichannel streamer were deployed. This short streamer was reconfigured in the field from the typical 24-channel array with a 100-meter group length, to a 12-channel array with a 50-meter group length.

However, because the shots were fired at 50-meter intervals, the seismic-reflection bounce points of the six odd-numbered channels fell 25 meters behind those of the six even-numbered channels. To optimize signal-to-noise ratio for stacking, the six-fold odd and even ensembles from adjacent bounce points were first gathered into 12-fold ensembles. Because this "vertical stack" combined information from pairs of surface points separated by 25 meters, some spatial "smearing" is present in the stacked data. The common-depth-points annotated on the display are, thus, only approximate CDP's.

## SEISMIC DATA FORMATS

The seismic data are available in three formats:

1. Electrostatically plotted data 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 tapes of the stacked data. Copies of these 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 tapes of the demultiplexed 12-fold shot data. 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: 10/80

SOURCE : BOLT AIR GUNS  
 AIR GUNS IN ARRAY: 5  
 NET VOLUME: 1326 CU. IN.  
 MANIFOLD PRESSURE: 1212 PSI  
 GUN DEPTH: 8.5 M  
 SHOT SPACING: 50 M

STREAMER: SEI MULTIDYNE, CHARGE COUPLED

GEOMETRY:

GROUP INTERVAL: 50 M  
 AVERAGE DEPTH: 7 M  
 GROUP LENGTH: 50 M  
 PHONES/GROUP: 30  
 DEPTH CONTROLLERS: SEI VARIABLE WING BIRDS

RECORDING:  
 SAMPLE INTERVAL: GUS HDR 4200, BINARY GAIN  
 RECORD LENGTH: 2 MS  
 GUS RECORDING FILTER: 8 S  
 NUMBER OF CHANNELS: 5-110 HZ  
 12

NAVIGATION:  
 SHOT ON: MARCONI INTEGRATED SYSTEM  
 PRIMARY NAVIGATION: DISTANCE  
 DIRECTION RECORDED: SATELLITE, LORAN C  
 NW

## PROCESSING SEQUENCE

DATE PROCESSED: 12/87

1 DEMULTIPLEX  
 DESAMPLE: 4 MS  
 GAIN RECOVERY:  
 REFORMAT: PHOENIX I

2 TRACE SHOT EDIT

3 STATIC CORRECTIONS  
 RECORDING STATICS: 20 MS  
 DATAUM: SEA LEVEL

4 CDP SORT

5 VELOCITY ANALYSIS  
 WINDOW LENGTH: 100 MS  
 WINDOW INTERVAL: 4 MS  
 BAND PASS FILTER: 3-6-40-50 HZ  
 VELOCITY RANGE: 1400-4000 M/S

6 NMO CORRECTION

7 12-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	8-11-40-50 HZ
2000.0 - 2800.0	9-10-35-45 HZ
3000.0 - 3800.0	10-30-40 HZ
4000.0 - 5000.0	10-25-35 HZ
5000.0 - 8000.0	10-20-30 HZ

9 SPIKING DECONVOLUTION  
 DESIGN WINDOW: 2000 MS  
 OPERATOR: 300 MS  
 WHITE NOISE ADDED: 80 PERCENT

10 AGC WINDOW: 500 MS

## PLOT PARAMETERS

MODE: VARIABLE AREA/WIGGLE TRACE

HORIZONTAL SCALE: 20 TR/IN

VERTICAL SCALE: 1.5 IN/S

CLIP: 2.0 TRACE WIDTHS

GAIN: 1.0 (SCALAR)

Table 1. Recording parameters, processing sequence and plot parameters for stacked multichannel seismic-reflection data collected on USGS cruise L11-80-W0.