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MULTICHANNEL SEISMIC-REFLECTION DATA COLLECTED
IN 1980 ACROSS THE ALEUTIAN ARC AND TRENCH, ALASKA

by

Dennis M. Mann, Dave W. Scholl, and Ray W. Sliter

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Menlo Park, CA

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In late June and early July 1980, the U.S. Geological Survey (USGS) conducted a reconnaissance geophysical survey from 173 to 176 W longitude along the Aleutian Arc and Trench, near the islands of Atka, Amlia, and Seguam (fig. 1). Approximately 780 km of 24-channel seismic-reflection data were recorded: six lines of data perpendicular and two subparallel to the trench-arc system. The profiles were collected on the USGS Research Vessel Samuel P. Lee, (USGS survey identifier L5-80-AA).

Seismic energy was provided by a tuned array of five airguns with a total volume of 1212 cubic inches of air at a manifold pressure of approximately 1900 psi. The recording system consisted of a 24-channel, 2400 meter long streamer with a group interval of 100 m, and a GUS (Global Universal Science) model 4200 digital recording instrument. A shooting geometry of 50-m shotpoint intervals with 100-m group intervals resulted in 24-fold data collection. Navigational control for the survey was provided by a Magnavox integrated navigation system using transit satellites fixes, doppler-sonar speed log augmented by Loran-C (Rho-Rho). A 2-millisecond sampling rate was used in the field; the data were later desampled to 4-milliseconds during the demultiplexing process. Record length of 14 to 16 seconds was used which, combined with a deep water delay, yielded up to 16 seconds of two way travel time. Processing was done at the USGS processing center in Menlo Park, California, in the sequence editing-demultiplexing, velocity analysis, CDP stacking, deconvolution-filtering, and plotting on an electrostatic plotter (Table 1). Plate 1 is a trackline chart showing detailed shotpoint navigation.

Significant recording problems occurred during this cruise. The airgun triggering system failed to function so an alternate method of starting the recording and firing the guns was developed. This system was only semi-automatic and resulted in loss of consistent time base from shot to shot. This was corrected in processing by calculating a static offset correction for each shot gather from correlation analysis. Combined with deep-water-delay these statics provide the proper water column for the section. Digital CDP gathers have had this static offset applied. In addition data quality along line 9 was degraded by heavy seas with swells to 20 ft.

The data are available in the following formats:

- 1) Electrostatically plotted profiles which have been deconvolved and filtered after stacking. Copies of the profiles may be purchased through:

National Geophysical Data Center
NOAA/EDIS/Code D64
325 Broadway
Boulder, Colorado 80303

- 2) Digital magnetic stack tapes which have been processed using velocities derived from velocity analysis. These tapes are not deconvolved or band-pass filtered. Stack tapes are in Phoenix format; a Seismograph Service Corp., 16-bit integer trace sequential format. Copies of the stack tapes and a description of the tape format can be obtained at the requesters expense by contacting:

Dennis M. Mann
U.S. Geological Survey
345 Middlefield Rd. MS 999
Menlo Park, California 94025
Tel. (415) 354-3174

- 3) Digital magnetic demultiplexed tapes. These tapes have been edited for missed shots and muting times. Demultiplexed tapes are in PhoenixI format; a Seismograph Service Corp. modified S.E.G.-X 32-bit floating point format. Copies of the demultiplexed tapes and a description of the tape formats can be obtained at the requesters expense by contacting Dennis Mann at the above address.

- 4) A presentation of geological and geophysical results from the 1981 Aleutian Arc survey available in:

Scholl, D.W., Grantz, A., and Vedder, J.G., 1988, Geology and Resource Potential of the Continental Margin of Western North America and Adjacent Ocean Basins - Beaufort Sea to Baja California Region, Circum-Pacific Council for Energy and Mineral Resources Earth Science Series, Vol. 6: Circum-Pacific Council for Energy and Mineral Resources, Houston, Texas.

- 5) Additional copies of this report may be obtained by contacting:

Books and Open-File Reports Section
U.S. Geological Survey
P.O. Box 25425
Federal Center, Bldg 810
Denver, Colorado 80225
Tel. (303) 236-7476

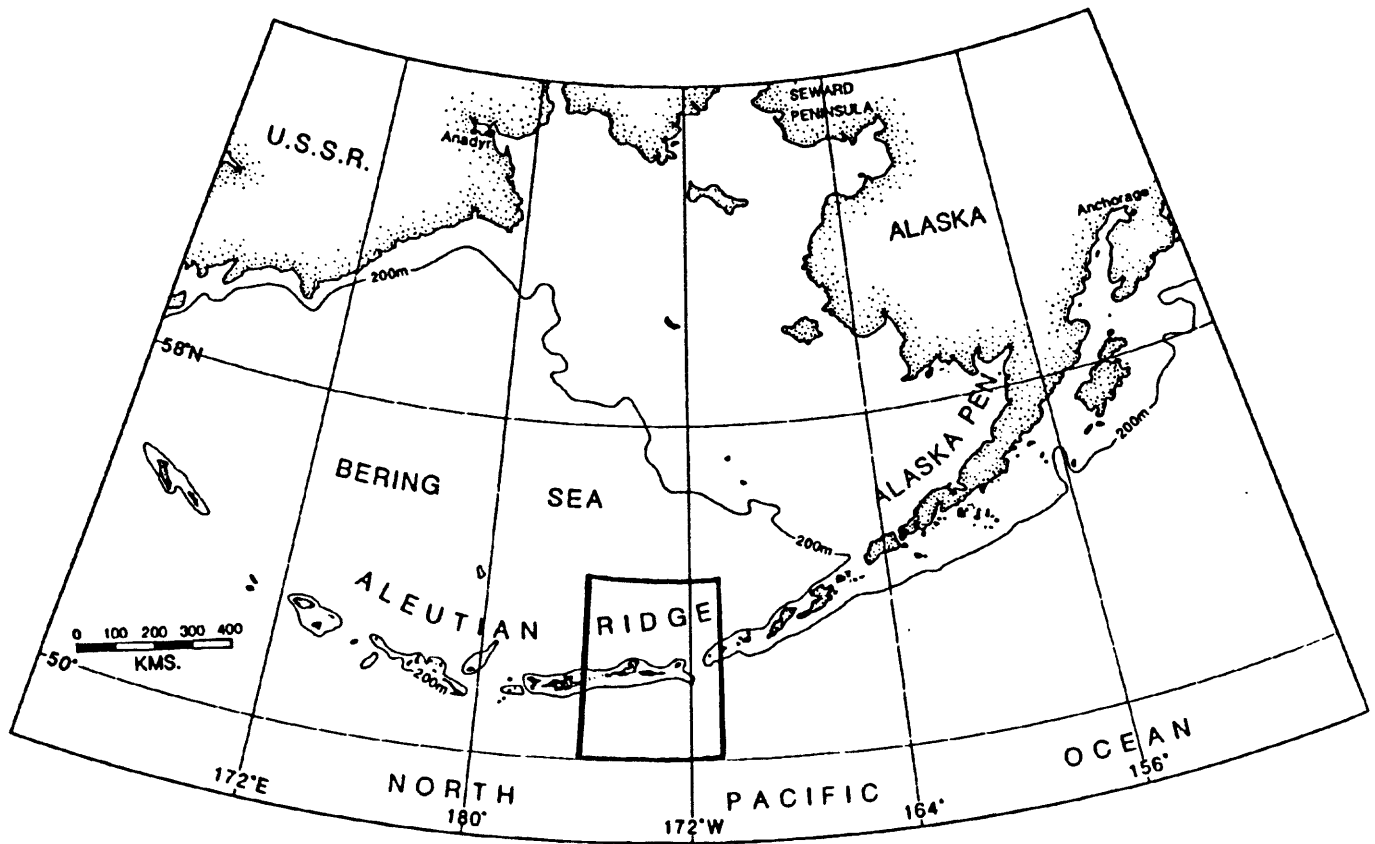


Figure 1. Area of study. Plates 1 and 2 show detailed tracklines and shotpoint locations.

RECORDING PARAMETERS

DATE RECORDED:	7/81
SOURCE:	BOLT AIR GUNS
AIR GUNS IN ARRAY:	5
NET VOLUME:	1313 CU. IN.
MANIFOLD PRESSURE:	2000 PSI
GUN DEPTH:	8.5 M
SHOT SPACING:	50 M
STREAMER:	SEI MULTIDYNE, CHARGE COUPLED
GEOMETRY:	

← 2611 M →
← 297 M →
← 38 M →

GROUP INTERVAL:	100 M
AVERAGE DEPTH:	12 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:	11 S
GUS RECORDING FILTER:	5-110 HZ
NUMBER OF CHANNELS:	24
NAVIGATION:	MAGNAVOX INTEGRATED SYSTEM
SHOT ON:	DISTANCE
PRIMARY NAVIGATION:	SATELLITE
DIRECTION RECORDED:	S

PROCESSING SEQUENCE

DATE PROCESSED:	2/82
1 DEMULTIPLEX:	
DESAMPLE:	4 MS
GAIN RECOVERY:	
REFORMAT:	PHOENIX I
2 TRACE SHOT EDIT:	
3 STATIC CORRECTIONS:	
RECORDING STATICS:	276 MS
DATUM:	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 24-FOLD STACK:	NORMALIZED WEIGHTING
8 BANDPASS FILTER:	COSINE
FILTER POINTS:	101
TIME WINDOW:	0.0-10.0 S
FREQUENCY:	4-8-50-60 HZ
9 PREDICTIVE DECONVOLUTION:	
DESIGN WINDOW:	2000 MS
OPERATOR:	200 MS
GAP:	32 MS
10 AGC WINDOW:	500 MS

PLOT PARAMETERS

MODE:	VARIABLE AREA/WIGGLE TRACE
HORIZONTAL SCALE:	20 TRACES/IN.
VERTICAL SCALE:	1.50 IN./S
CLIP:	2.0 TRACE WIDTHS
GAIN:	1.0 (SCALAR)

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Table 1. Recording parameters, processing sequence and plot parameters for stacked multichannel seismic reflection data collected on USGS cruise L5-80-AA.