

SONOBUOY SEISMIC DATA COLLECTED DURING 1982 IN THE BERING SEA

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In July-August 1982, the U.S. Geological Survey participated in a government-industry cooperative project for reflection/refraction profiling (GICORP), co-directed by the Center for Marine Crustal Studies, Gulf Oil Corporation. During the cruise (L9-82-B5) aboard the U.S.G.S. research vessel S.P. Lee, 53 seismic sonobuoy profiles, as well as other seismic and geopotential data, were recorded over the Bering Sea continental shelf and abyssal Aleutian basin. This report includes microfilm copies of the sonobuoy seismic monitor records, logsheets, and navigation collected during the cruise. Sonobuoy data have also been recorded on magnetic tape.

The seismic sonobuoy data from the Bering Sea (Figure 1) were recorded using a 5-airgun source array with air displacement that varied from 1311 to 2300 in³ (Table 1). Two types of sonobuoys were used, military (U.S. Navy-type 41B) and commercial (Ref Tek 1-type 176 mhz). Detailed procedures for the shipboard recording and display of the sonobuoy data are described in Childs and Cooper (1978). Briefly, the sonobuoys were deployed with hydrophone depths of 60-65 feet and were recorded on ship on both analog magnetic tape and paper monitor records. Data displayed on the monitor records were read from the analog magnetic tapes, rather than directly from the sonobuoy receiver, to verify that good sonobuoy data were being recorded on the magnetic tape. Later, the sonobuoy tapes were replayed with variable bandpass filter settings and different vertical time scales to produce additional paper monitor records. The microfilm includes two monitor records for each sonobuoy profile, a 10-second record that was generated during the actual sonobuoy run (useful for reflection/refraction velocity determinations) and a 32-second record that was replayed from the magnetic tape (useful for monitoring the direct arrival and refraction arrivals). For two sonobuoy stations (242 and 243), the same procedures were followed and sonobuoy data were also recorded digitally on a shipboard multichannel seismic recording system.

Shipboard navigation was done by computer with inputs from TRANSIT satellite, Loran C-hyperbolic, Loran C-rho rho, gyro, and a water speed indicator. Firing of the airgun array was controlled by the navigation system and was done on either a time basis (17 to 22 seconds) or a distance basis (50m or 100m). Multichannel seismic-reflection, high resolution seismic-reflection, gravity, magnetic, and bathymetry data were recorded simultaneously with the sonobuoy seismic data.

Two points concerning the sonobuoy operations are noteworthy:

1. Sonobuoys recorded in the St. George Basin (buoys 192 to 197), Bristol Basin (buoys 198 to 205), and Navarin Basin (buoys 225-228 and 233-241) areas often have high seismic noise levels caused by other seismic boats operating nearby. Consequently, the data in these areas are degraded and reflectors/refractors are more difficult to identify.
2. On many sonobuoy profiles, especially those recorded in very shallow water (25-40 m), the direct arrival (ship to buoy through the water) is noticeably curved, rather than being straight, at large offsets (20-40 km). Because the direct arrival is curved and the refraction arrival at similar offsets is usually not curved, ship speed changes or buoy drift do not appear to be the explanation for the curved direct arrival. The explanation is unclear but may be related to velocity variations in the water column along the sonobuoy profile. Surface-water temperatures have been measured for each sonobuoy (see logsheets), however these temperatures are uniform and do not suggest variations in the surface-water velocity.

Seismic sonobuoy data from the GICORP project are slated for digital processing at the Center for Marine Crustal Studies, Gulf Oil Corporation. Analog magnetic tapes will be converted to digital tapes and processing done from the digital tapes. Full size copies of seismic sonobuoy monitor records are available for inspection at USGS, 3475 Deer Creek Road, Rm B112, Palo Alto, California. For information concerning the inspection of these records and the availability of the analog and digital (available when converted) tapes contact:

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345 Middlefield Road
Menlo Park, Ca. 94040
415-856-7094

Copies of the microfilm data and digital navigation data are available from:

Dr. Michael Loughridge
Chief, Marine Geology and Geophysics Division
National Geophysical and Solar-Terrestrial Data Center
NOAA/EDIS/NGSDC, Code D64
325 Broadway
Boulder, Colorado 80303
303-497-6338

REFERENCES:

Childs, J.R., and Cooper, A.K., 1978, Collection, reduction, and interpretation of marine seismic sonobuoy data, U.S. Geol. Survey Open-File Report 78-442, 219 p.

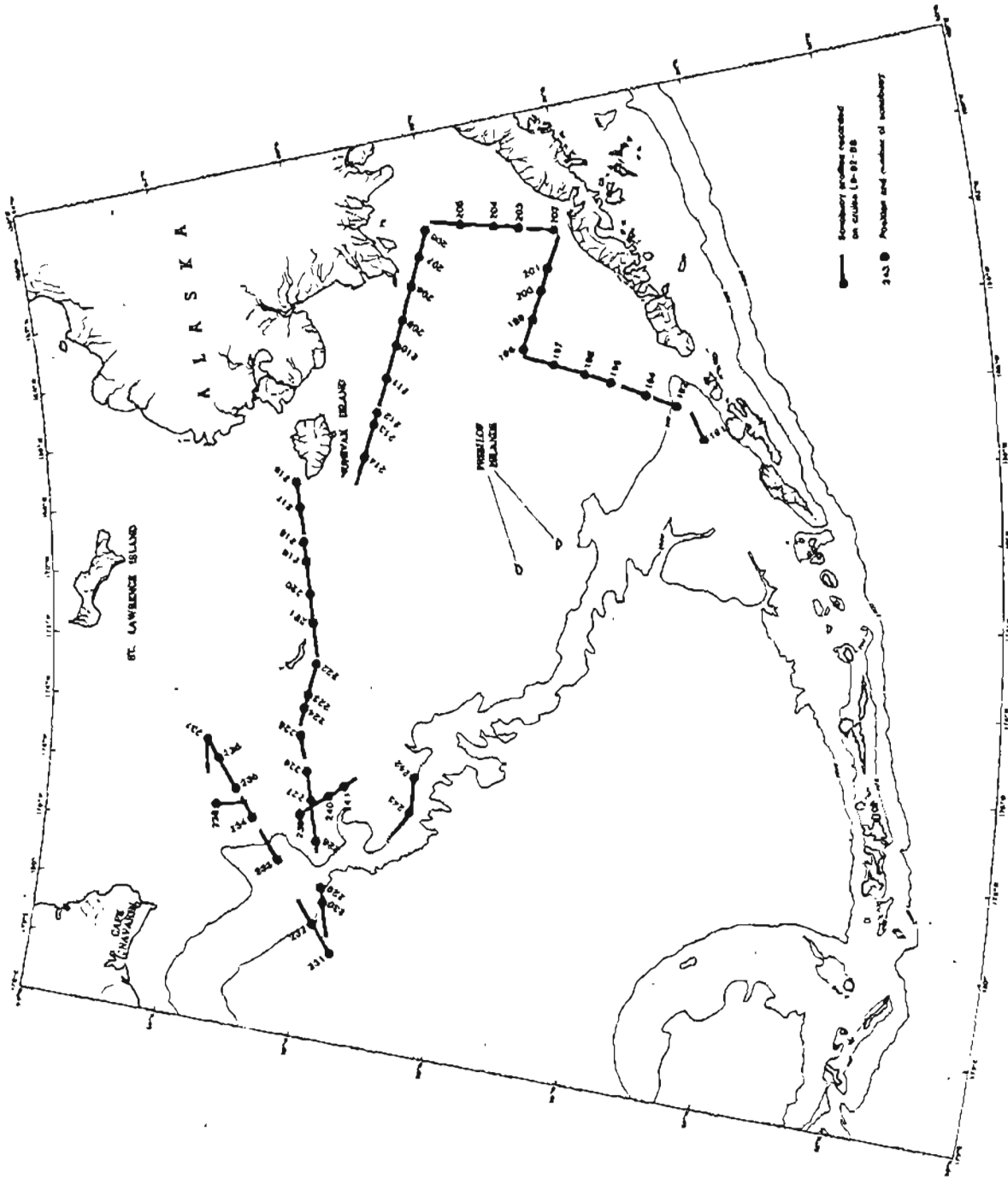


Figure 1 Index map of the Bering Sea showing location of sonobuoy profiles recorded in 1982 on cruise L9-82-BS.

Table 1: Sonobuoy information

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time		Latitude	Longitude	Sono Type	Source (in ³)	
				JD	Hour					
191	START	1	515	731	193	1842.0	54 20.51	-166 59.21	R	1311
191	END	1	1352	504	193	23 6.0	54 28.60	-166 22.69		
192	START	2	427	292	194	129.0	54 41.23	-166 10.08	R	1311
192	END	2	1340		194	548.0	55 2.76	-165 53.93		
194	START	2	1560	124	194	650.0	55 8.35	-165 49.74	M	1311
194	END	2	2435		194	1058.0	55 29.12	-165 31.10		
195	START	2	2808	110	194	1249.0	55 37.93	-165 22.73	M	1311
195	END	2	3535		194	1633.0	55 55.35	-165 10.52		
196	START	2	3692	95	194	1722.0	55 59.33	-165 7.64	M	1311
196	END	2	4729		194	2240.0	56 27.14	-164 47.02		
197	START	2	4808	77	194	23 4.0	56 29.21	-164 45.49	M	1311
197	END		5788	70	195	350.0	56 52.38	-164 28.52		
198	START	3	119	70	195	5 3.0	56 52.96	-164 18.56	M	1311
198	END	3	1140	74	195	1010.0	56 41.50	-163 32.57		
199	START	3	1193	74	195	1026.0	56 40.88	-163 30.12	M	1311
199	END	3	2107		195	15 5.0	56 30.42	-162 50.26		
200	START	3	2148	75	195	1517.0	56 29.95	-162 48.64	R	1311
200	END	3	2926		195	1926.0	56 21.41	-162 16.34		
201	START	2	3038	40	195	1945.0	56 20.78	-162 13.86	M	1311
201	END	3	4280	40	196	158.0	56 7.32	-161 24.87		
202	START	4	208	42	196	4 3.0	56 12.29	-161 14.10	M	1311
202	END	4	1067	69	196	835.0	56 35.01	-161 5.40		
203	START	4	1276	67	196	940.0	56 40.49	-161 3.19	M	1311
203	END	4	2153	59	196	1351.0	57 3.51	-160 53.91		
204	START	4	2177	59	196	1359.0	57 4.22	-160 53.62	R	1311
204	END	4	3110	60	196	19 0.0	57 28.66	-160 43.57		
205	START	4	3257	59	196	1953.0	57 32.55	-160 41.98	R	1311
205	END	4	4269	50	197	211.0	57 59.13	-160 30.15		
206	START	5	475	41	197	4 9.0	58 3.89	-160 41.79	R	2300
206	END		2465	44	197	932.0	58 13.20	-161 23.64		
207	START	5	2513	38	197	949.0	58 13.71	-161 25.85	R	2000
207	END	5	3406		197	1530.0	58 22.84	-162 7.95		
208	START	5	3458	46	197	1553.0	58 23.40	-162 10.57	R	2100
208	END	5	4580		197	2220.0	58 34.81	-163 3.77		
209	START	5	4607	25	197	2230.0	58 35.07	-163 5.13	R	2100
209	END	5	5403	30	198	331.0	58 42.80	-163 43.36		
210	START	5	5463	29	198	352.0	58 43.37	-163 46.31	R	2100
210	END	5	6543	27	198	10 0.0	58 54.35	-164 38.05		

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time JD	Time Hour	Latitude	Longitude	Sono Type	Source (in ³)
211	START	6593	27	198	1017.0	58 54.82	-164 40.36	R	2100
211	END	7590	25	198	1632.0	59 4.51	-165 28.28	R	2130
212	START	7704	25	198	1714.0	59 5.76	-165 34.29	M	1900
213	START	8132	23	198	1926.0	59 9.94	-165 55.10		
212	END	8824		198	23 6.0	59 16.60	-166 28.93		
213	END	9163	26	199	115.0	59 19.68	-166 45.77		
214	START	9261	27	199	2 3.0	59 20.84	-166 52.22	R	2100
214	END	10230	31	199	751.0	59 29.99	-167 41.73	M	1800
215	START	161	25	200	2231.0	60 21.60	-167 22.10		
215	END	420	26	200	55.0	60 21.53	-167 26.27		
216	START	340	25	200	23 1.0	60 21.51	-167 27.27	M	1800
216	END	1139	30	201	432.0	60 19.75	-168 15.87		
217	START	1210	31	201	457.0	60 19.62	-168 19.85	R	2100
217	END	1987	39	201	930.0	60 17.02	-169 7.76		
218	START	2328	41	201	1010.0	60 16.76	-169 15.35	M	2130
218	END	3328	54	201	15 0.0	60 15.50	-170 8.82		
219	START	127	50	202	7 7.0	60 16.06	-169 53.12	R	2130
219	END	1123	64	202	1255.0	60 13.40	-170 47.31		
220	START	1199	64	202	1322.0	60 13.15	-170 51.84	M	2100
220	END	2134	62	202	1830.0	60 10.05	-171 42.51		
221	START	2168	61	202	1840.0	60 9.96	-171 44.17	M	1900
221	END	3262	58	203	045.0	60 5.86	-172 42.30		
222	START	127	58	203	142.0	60 6.73	-172 51.43	M	1900
223	START	1292	87	203	9 8.0	60 14.30	-173 52.64	R	1900
222	END	1450		203	10 0.0	60 15.21	-174 0.91		
223	END	2329		203	1119.0	60 16.82	-174 14.00		
224	START	1717	97	203	1125.0	60 16.94	-174 15.00	M	1900
224	END	2329	106	203	1440.0	60 20.78	-174 47.60	M	1700
225	START	296		203	1625.0	60 19.38	-175 4.36		
225	END	5620		203	2035.0	60 14.90	-175 45.40		
226	START	1570	128	203	2311.0	60 11.85	-176 11.28	M	1311
226	END	2412		204	346.0	60 7.38	-176 58.68		
227	START	2453	135	204	358.0	60 7.10	-177 0.83	M	1311
227	END	3657	142	204	10 0.0	60 0.59	-178 1.52		
228	START	3898	139	204	1110.0	59 59.37	-178 13.23	M	1311
228	END	4180		204	1240.0	59 57.65	-178 29.50		
229	START	5401	2670	204	19 7.0	59 50.20	-179 33.26	M	1311
230	START	5886	2850	204	2222.0	59 47.16	-179 57.75	R	1311

Sonobuoy No.	Line	Shot Point	Water Depth (m)	Time JD Hour	Latitude	Longitude	Sono Type	Source (In3)
229	EMB	6160		204 2359.0	59 45.37	179 47.75	R	1311
230	EMB	7043		205 445.0	59 40.16	179 2.23		
231	START	50	3555	205 10 3.0	59 35.34	178 33.69	M	1311
231	EMB	1132		205 1618.0	59 53.06	179 19.50		
232	START	1631	2598	205 1631.0	59 53.70	179 21.20	M	1311
232	EMB	2112		205 2131.0	60 8.81	-179 58.25		
233	START	3571	281	206 5 8.0	60 32.00	-178 53.58	M	1311
233	EMB	4727	152	206 1048.0	60 49.86	-178 2.14		
234	START	5200	136	206 1311.0	60 57.12	-177 40.67	R	1311
234	EMB	5988	122	206 1726.0	61 9.10	-177 4.64		
235	START	6278	116	206 19 0.0	61 13.37	-176 51.13	M	1311
235	EMB	7300		207 026.0	61 28.58	-176 3.26		
236	START	7370	98	207 048.0	61 29.56	-176 0.02	M	1311
236	EMB	8223		207 525.0	61 41.99	-175 19.53		
237	START	43	80	207 821.0	61 62.06	-175 16.81	M	1311
237	EMB	1291		207 1440.0	61 40.04	-176 27.26		
238	START	247	100	207 21 9.0	61 30.67	-177 23.07	R	1700
238	EMB	1275		208 238.0	61 3.58	-177 14.51		
239	START	47	139	208 1227.0	60 15.45	-177 27.67	M	1700
240	START	550	137	208 1511.0	60 4.57	-177 11.81	R	1700
239	EMB	1142	136	208 1831.0	59 51.71	-174 52.76		
241	START	1153	136	208 1834.0	59 51.55	-176 52.44	M	1400
240	EMB	1805	136	208 22 7.0	59 39.07	-176 33.02		
241	EMB	2234	135	209 1 0.0	59 28.43	-176 17.60		
242	START	43	152	213 545.0	58 37.94	-176 10.90	M,R	2000
242	EMB	590	142	213 11 0.0	58 38.99	-177 8.50		
243	START	42	142	213 1112.0	58 39.32	-177 10.68	R	2000
243	EMB	699		213 1530.0	58 52.11	-177 51.60		

M = Military sonobuoy - U.S. Navy type 41B

R = Commercial sonobuoy - REF TEX 1