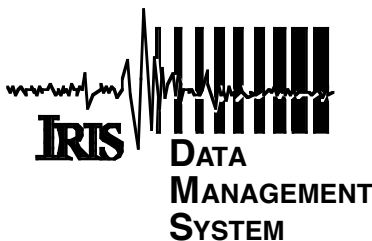


PSINE

Parkfield Seismic Imaging Ninety Eight

R.D. Catchings, M.R. Goldman, M.J. Rymer, G. Gandhok, G.S. Fuis
US Department of the Interior
USGS, Menlo Park

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Data Report for the Main Line of the PSINE Seismic Survey Across the San Andreas Fault and SAFOD Site Near Parkfield, California *by*

R. D. Catchings, M. R. Goldman, M. J. Rymer, G. Gandhok, and G. S. Fuis □

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards or with the North American Stratigraphic Code. Any use of product names is for descriptive purpose only and does not imply endorsement by the U.S. Government.

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U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Menlo Park, California

Introduction

In October and November 1998, the U.S. Geological Survey, Virginia Polytechnic Institute, Stanford University, and Geometrics Corporation jointly acquired a high-resolution seismic reflection/refraction profile across the San Andreas Fault Zone (SAFZ) and the proposed San-Andreas-Fault-Observatory-at-Depth (SAFOD) drill site located near Parkfield, California (Fig. 1a). We refer to this seismic survey as the Parkfield Seismic Imaging-Ninety Eight (PSINE) survey, the highest-resolution seismic survey yet completed across the SAF in central California. This report, which presents acquisition parameters and example shot gathers for the PSINE seismic survey, is intended to provide necessary information for those who wish to use the PSINE data for research.

The PSINE survey is part of the proposed SAFOD investigation: a proposed study to investigate physical and chemical properties and processes that control deformation and earthquake generation within the SAF zone by drilling into the active trace of the fault (Zoback et al., 1998; www.earthscope.org). Geological and geophysical investigations are planned prior to, during, and after completion of the borehole. The PSINE survey, which was one of the pre-drilling investigations, was designed to determine the subsurface stratigraphic and structural relations in the vicinity of the proposed drill site, to better locate the target fault zone within the subsurface, and to image obstacles that may impede drilling. Data acquisition parameters, experiment setup, and parameters needed to work with the PSINE data are provided in this report. The PSINE data provide useful reflective images (Catchings et al., in prep; Rymer et al., in prep; Hole et al.) and velocity data (Catchings et al., 2002) in the vicinity of the SAFOD drill site and the San Andreas fault.

Local Geology and Tectonics

The San Andreas fault is a right-lateral, strike-slip fault that extends approximately 1100 km from near the U.S.-Mexican border to northwest of Cape Mendicino, California, and it forms the boundary between the Pacific plate to the southwest and the North American plate to the northeast (Fig. 1a). The town of Parkfield lies near the central segment of the SAF and has been considered an important area for study of earthquakes over the past 20 years. Historically in the Parkfield area, moderate magnitude (M 5.5 to 6) earthquakes have occurred on the SAF on average every few decades (Bakun and McEvelly, 1984; Bakun and Lindh, 1985). However, small to moderate earthquakes (M ~4 or less) occur more frequently (Nadeau and McEvelly, 1997). In the Parkfield area, the SAF has a long history of strike-slip movement within the present surface fault zone and along nearby sub-parallel faults (Dickinson, 1966; Sims, 1992; Rymer et al., in prep.). Although there are numerous mapped faults in the Parkfield area, the most recently active surface trace extends along the length of Middle

Mountain, a roughly symmetrical ridge about 15 km long and about 3.2 km wide (Fig. 1). Within our study area, the surface trace of the SAF lies east of the crest of Middle Mountain (Dickinson, 1966; Rymer et al., in prep.).

PSINE Data Acquisition

The PSINE survey consisted of three separate seismic surveys: (1) an approximately 5-km-long seismic reflection and refraction survey across the SAF (main line), (2) a 1-km-long seismic reflection and refraction survey parallel to the SAF, and (3) a 3-D reflection and refraction survey across the active surface trace of the SAF (Fig. 1b). This report describes data acquisition parameters only along the main profile of the PSINE survey.

The main PSINE profile was approximately centered on the proposed SAFOD drill site and was oriented \sim N 55° E, which is slightly less than perpendicular to the active trace of the SAF (\sim N 45° W) (Fig. 1b). Approximately 3.5 km of the seismic profile was on the southwest side of the surface trace of the SAF, with the remaining \sim 1.5 km of the profile on the northeast side. The main seismic profile consisted of an \sim 5-km-long, cabled recording array with 13 linked Geometrics™ multi-channel seismographs (Fig. 1c). Of the 13 multi-channel seismographs (840 channels) used, one seismograph was a 120-channel unit, and the remaining 12 seismographs were 60-channel units. Figures 1b and c show the setup for the seven recording sites along the main profile. With the exception of site 1, there were two 60-channel seismographs at each site, with 60 channels deployed to the northeast and 60 channels deployed to the southwest of the site. At site 1, a single 120-channel seismograph was deployed with a total of 840 channels along the main profile. Sensors consisted of a combination of 40-Hz, 28-Hz, and 10-Hz Mark Products™ geophones, spaced at 5-m intervals over the seismic array, except near the southwestern 1.2 km and the northeastern 0.6 km of the profile (see Table 2), where the geophone spacing was 10 m. The 10-Hz geophones were deployed on the southwestern (300 m) and northeastern (600-m) ends of the profile, and the 40-Hz and 28-Hz geophones were used in the central part of the profile.

Shot points were spaced at a constant 10-m interval over the entire array, and shots were co-located with the geophones (1 m lateral offset). Most shots consisted of 1- or 2-lb explosions of ammonium nitrate in \sim 3-m-deep shot holes, but where it was not feasible to use explosive shots, we used 400-grain, Betsy-Seisgun™ blanks in \sim 0.5-m-deep holes.

Timing for the explosive shots was accomplished with USGS shooting systems that were synchronized with USGS master clocks. The USGS master clocks were used to trigger the seismographs approximately 50 ms before the explosion. Seismograph pairs at each recording site (Fig. 1c) were connected to a single master clock to maintain exact timing between the pairs. The most distant two channels at each site were also co-located

with those of adjacent sites, as a secondary check on timing between sites. Timing for Betsy-Seisgun™ sources was accomplished by connecting all seismographs with a series of cables that were also attached to the Betsy Seisgun. The hammer used to fire the shots formed a closed circuit with the seismographs, resulting in an electrical signal being transmitted to the seismograph when the hammer made contact with the seisgun.

Acquisition and recording parameters for the main line of the PSINE survey are presented in Tables 1a and 1b. Data were recorded without acquisition filters for 5 s at a 0.5-ms sampling rate and stored on the hard disk of the seismograph during field acquisition. After recording each day, the data were retrieved from the hard disk of the seismographs and downloaded to 4-mm DAT tapes for permanent storage.

Shot-Point and Receiver Locations

To properly account for variations in geometry, each shot point and geophone location was surveyed using an electronic distance meter (EDM) or a Global Positioning System (GPS) with theoretical accuracies of a few centimeters. The geometry data for the main profile of the PSINE survey are presented in Appendix A and are shown graphically in figures 2-5. Geophone elevations varied by about 120 m along the profile (Fig. 2), with the highest elevation occurring at Middle Mountain near meter 3329 of the survey and the lowest elevation occurring near the western part of the seismic profile, near meter 1011. The array of geophones varied from a straight line (that connects the first and 220th geophone) by less than 40 m along the entire length of the 4893-m-long array (Fig. 3). Variations in shot point elevations were less than 120 m (Fig. 4), and the geophone locations varied from a linear array by no more than 40 m along the profile (Fig. 5).

Theoretical Fold

PSINE survey utilized a stationary recording array, with all channels active for all shots. This setup resulted in linearly varying fold along the seismic profile (Fig. 6). The maximum fold (466) occurs near the center of the seismic profile, and the minimum fold (2) occurs near the ends of the profile. For seismic reflection stacking purposes, the deeper structure should be best resolved near the central part (highest fold) of the seismic profile. However, the ~1-kg shots were energetic enough to yield reflections from about 5 km depth along the entire seismic profile (Catchings et al., in prep).

Data Processing

We minimally processed the shot gathers presented in this report to provide a more complete and useful data set. Because data from 13 separate seismographs were

combined to form the shot gathers, data from each seismograph was timed with adjacent seismographs using the USGS master clocks. Afterward, timing was checked using autocorrelation of seismic traces from co-located channels of adjacent seismographs. After individual shot gathers were assembled, we used trace editing to remove noisy or dead traces. For display purposes in the report, we used minimum phase bandpass filtering of 10-20-200-400 to help compensate for differing types of geophones along the seismic profile. However, the data available to researchers are unfiltered, with no acquisition or processing filters used on those data.

The geometrical setup of the PSINE survey generated seismograms for every 5 m of the profile, except near the ends, where the geophones were spaced every 10 m. To make the seismogram spacing uniform along the entire array, we used trace in-filling near the ends of the seismic profile, whereby, the signal from adjacent (10-m-spaced) geophones were averaged to form a composite seismogram, and the resulting seismogram was inserted at one-half the distance between those stations. Because of the close spacing of recording channels (10 m) relative to the wavelength of the seismic signal, this technique worked well in providing an uniformly spaced shotgather.

Because of the large cumulative volume of data for the PSINE survey, we segmented the data into smaller volumes for ease in handling the data with the PROMAX processing package. For example, data labeled as series 1000 correspond to shot gathers between meters 0 and 531 of the seismic profile (see Table 1 and Fig. 1c). Shot gathers are labeled by FFID # (Field File Identification Number). To determine the location of specific FFIDs, please see Fig. 1c and Table 3.

Seismic Data

We present representative shot gathers from the seismic profile (figures 7-11). Due to relatively low cultural noise in the area, signal-to-noise ratios were high, and most ~1-kg explosive sources were sufficient to propagate across the entire array. The data are available in SEG-Y format as shot gathers.

However, to fully understand the structure of the crust along the PSINE profile, more intensive processing of the data is required. To date, some of the data have been processed and the structure of the crust has been previously reported. First-arrival refractions were used to develop 2-D velocity models along the main line of the PSINE survey (Catchings et al., 2002), and near-vertical reflection images have been developed by stacking the shot gathers (Catchings, et al, in prep; Rymer et al., in prep). Steeply dipping reflections and diffractions have been migrated to develop an image of near-vertical structures in the crust (Hole et al., 2001).

Data Availability

Data from the main line of the PSINE survey are available by contacting R. D. Catchings at the address listed on the front of this report or by contacting the IRIS-PASSCAL data center.

Acknowledgements

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Figures

Figure 1a. Location of the study area and the PSINE main profile of this report (heavy solid line). Faults from Jennings (1994).

Figure 1b. Layout of the PSINE profile relative to the San Andreas Fault Zone (SAFZ) and the San Andreas Fault Observatory at Depth (SAFOD) drill site. Numbers 1-9 refer to the site setup locations. Also shown are a cross line and a 3D array that were also recorded but not included in this report. Smaller numbers 001-936 along the profile refer to the channel (geophone) numbers. Base from Stockdale Mountain 7.5-minute quadrangle.

Figure 1c. Topographic profile along the PSINE seismic profile with site setup and data grouping information. Site setup # (1-7) refers to the physical location of the recording sites (shown as black dots). Two 60-channel seismographs were located at all recording sites (except site 1), with 60 channels deployed to the northeast and 60 channels deployed to the southwest. At site 1, a single 120-channel seismograph was deployed. The dashed lines denote the limits of geophone deployments for each recording site. Shot gathers were subdivided into data series ranging from 1000 to 11000 for ease of data processing. The relative geographic locations of the data series (see Table 3) are shown. SAF refers to the mapped surface trace of the San Andreas fault. SP # refers to shot-point locations (Field File ID Numbers) for shot gathers shown in figures 7-11.

Figure 2. Geophone elevation along PSINE seismic profile. Elevation is relative to the topographically lowest shot point along the profile.

Figure 3. Variation of geophones from a line that connects the first and 220th geophone along the profile.

Figure 4. Shotpoint elevation along PSINE seismic profile. Elevation is relative to the topographically lowest shot point along the profile.

Figure 5. Variation of geophones from a line connecting the first and 110th geophone along the profile.

Figure 6. Fold as a function of distance along the PSINE seismic profile.

Figure 7. Example shot gather with the shot point FFID 1010 located near the southwestern end of the PSINE profile. The horizontal axis shows the channel number of

the recording array. The vertical axis is time in milliseconds. SAF refers to the surface trace of the San Andreas fault.

Figure 8. Example shot gather with the shot point FFID 1102 located near the southwest central part of the PSINE profile. The horizontal axis shows the channel number of the recording array. The vertical axis is time in milliseconds. SAF refers to the surface trace of the San Andreas fault.

Figure 9. Example shot gather with the shot point FFID 1224 located near the central part of the PSINE profile. The horizontal axis shows the channel number of the recording array. The vertical axis is time in milliseconds. SAF refers to the surface trace of the San Andreas fault.

Figure 10. Example shot gather with the shot point FFID 1333 located near the north central part of the PSINE profile. The horizontal axis shows the channel number of the recording array. The vertical axis is time in milliseconds. SAF refers to the surface trace of the San Andreas fault.

Figure 11. Example shot gather with the shot point FFID 1426 located near the north-eastern part of the PSINE profile. The horizontal axis shows the channel number of the recording array. The vertical axis is time in milliseconds. SAF refers to the surface trace of the San Andreas fault.

References

- Bakun, W. H., and T. V. McEvelly (1984). Recurrence models and Parkfield, California, earthquake, *J. Geophys. Res.* 89, 3051-3058.
- Bakun, W. H., and A. G. Lindh (1985). The Parkfield, California, earthquake prediction experiment, *Science* 229, 619-624.
- Catchings, R. D., M. J. Rymer, M. R. Goldman, J.A. Hole, R. Huggins, and C. Lippus (2002). High-resolution seismic velocities and shallow structure of the San Andreas Fault Zone at Middle Mountain, Parkfield, California, *Bull. Seis. Soc. Am.* 92, 2493-2503.
- Catchings, R. D., M. J. Rymer, and M. R. Goldman (in prep). High-resolution seismic reflection images of active strands of the San Andreas fault zone near Parkfield, California.
- Dickinson, W. R. (1966). Structural relationships of San Andreas fault system, Cholame Valley, and Castle Mountain Range, California, *Geol. Soc Am. Bull.* 77, 707-726.
- Hole, J. A., R. D. Catchings, K.C. St. Clair, M. R. Rymer, D.A. Okaya, and B.J. Carney (2001). Steep-dip seismic imaging of the shallow San Andreas Fault near Parkfield, *Science*, 294, 1513-1515.
- Jennings, C. W. (Compiler). Fault activity map of California and adjacent areas, Calif. Dept. Conserv. Div. Mines Geol., Geologic Data Map Series No. 6, scale 1:750,000.
- Nadeau, R. M., and T. V. McEvelly (1997). Seismological studies at Parkfield VI: Moment release rates and estimates of source parameters for repeating small earthquakes, *Bull. Seis. Soc. Am.* 88, 790-814.
- Rymer, M.J. 1981, Geologic map along a 12-kilometer segment of the San Andreas fault zone, southern Diablo Range, California: U.S. Geol. Surv. Open-File Report 81-1173, scale 1:12,000.
- Rymer, M. J., R. D. Catchings, M. R. Goldman, G. S. Fuis, R. Huggins, C. Lippus, and J. Hole (in prep). Shallow structure of the San Andreas fault zone near Parkfield, central California, as inferred from seismic reflection profiling and surface geology, *Bull. Seis. Soc. Am.*

Sims, J.D., (1992). Chronology of displacement on the San Andreas fault in central California; evidence from reversed positions of exotic rock bodies near Parkfield, California, in *The San Andreas Fault System; Displacement, Palinspastic Reconstruction, and Geologic Evolution*, edited by R.E. Powell, R.J. Weldon, II, and J.C. Matti, Geol. Soc. Am. Mem. 178, 231–256.

Zoback, M. D., S. H. Hickman, and W. L. Ellsworth (1998). Scientific drilling into the San Andreas fault at Parkfield, California: Project overview and operational plan, written manuscript proposal submitted to National Science Foundation, 146 pp; www.earthscope.org.

Table 1a. Acquisition parameters for the PSINE main seismic profile. Distance is relative to the first shot point.

Profile #	Orientation	Length of geophone Profile (m)	Length of shot Point Profile (m)	No. of shots	No. of CDPs	Maximum fold
Parkfield Main Line	SW-NE	4893.75	4843.25	466	4868.5	466

Table 1b. Acquisition and recording parameters for the PSINE main seismic profile.

Sampling rate	Recording time	Filters	Pretrigger
0.5 ms	5 sec	out	50 ms

Table 2. Site set up for the PSINE main line

Distance along profile	Geophone type	Site setup #	Geophone spacing
0-300 m	10 Hz	1	10 m
300 m-1.2 km	40 Hz	1	10 m
1.2 km-1.8 km	40 Hz	2	5 m
1.8 km-2.4 km	40 Hz	3	5 m
2.4 km-3.0 km	40 Hz	4	5 m
3.0 km-3.6 km	40Hz	5	5 m
3.6 km-4.2 km	40 Hz	6	5 m
4.2 km-4.5 km	28 Hz	7	5 m
4.5 km-4.8 km	10 Hz	7	10 m

Table 3. Array set up for PSINE main seismic profile by data series, FFID #, and distance.

Series	FFID	Distance (meters)
1000	1001-1052	0-530.8
2000	1053-1092	540.66-960.17
3000	1093-1128	970.66-1338.24

4-5000	1129-1198	1348.35-2064.33
6000	1199-1262	2074.92-2775.52
7000	1263-1308	2794.24-3238.51
9000A	1309-1359	3247.57-3747.88
9000B	1360-1405	3757.99-4238.44
10-11000	1406-1466	4248.52-4843.25

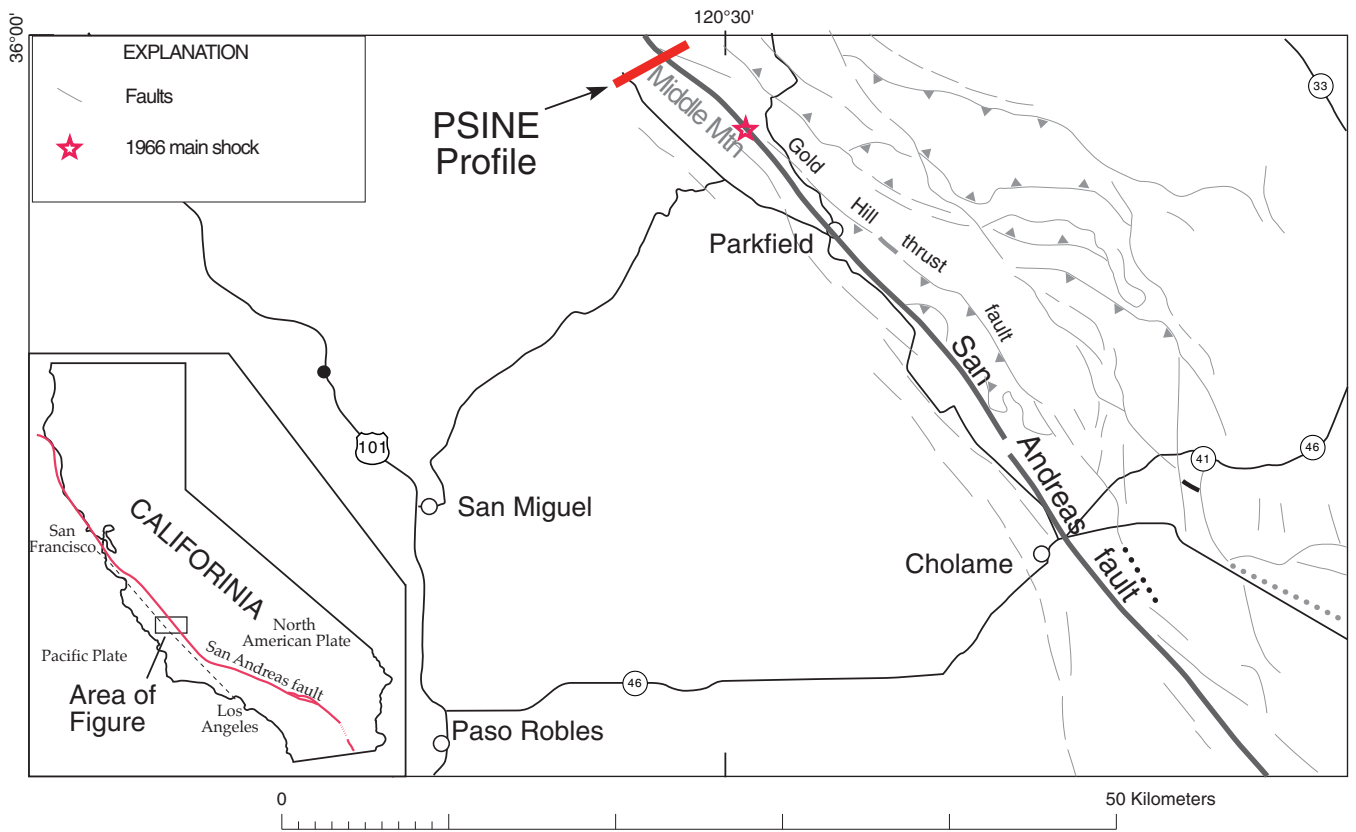


Fig 1a.

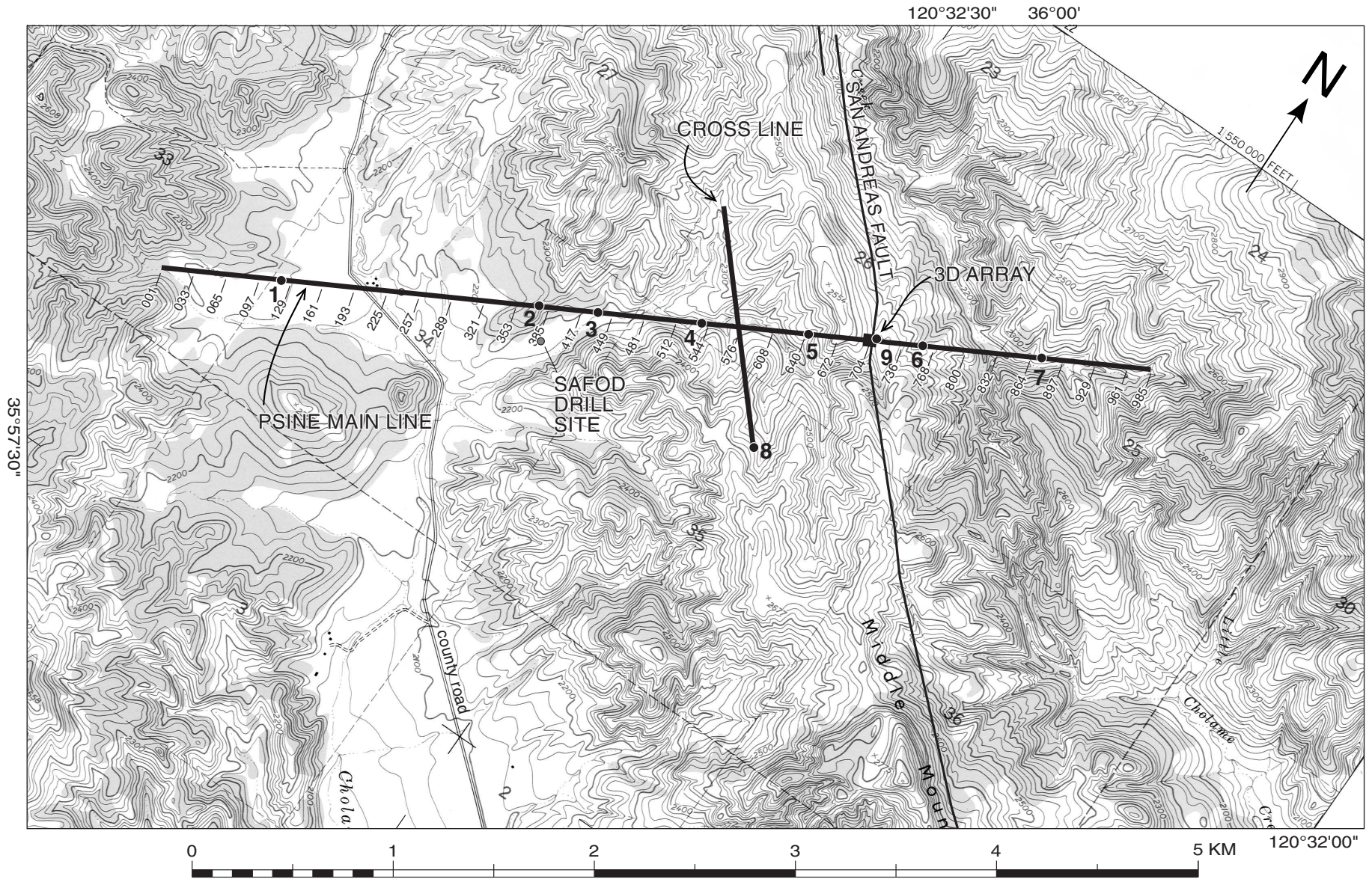


Figure 1B

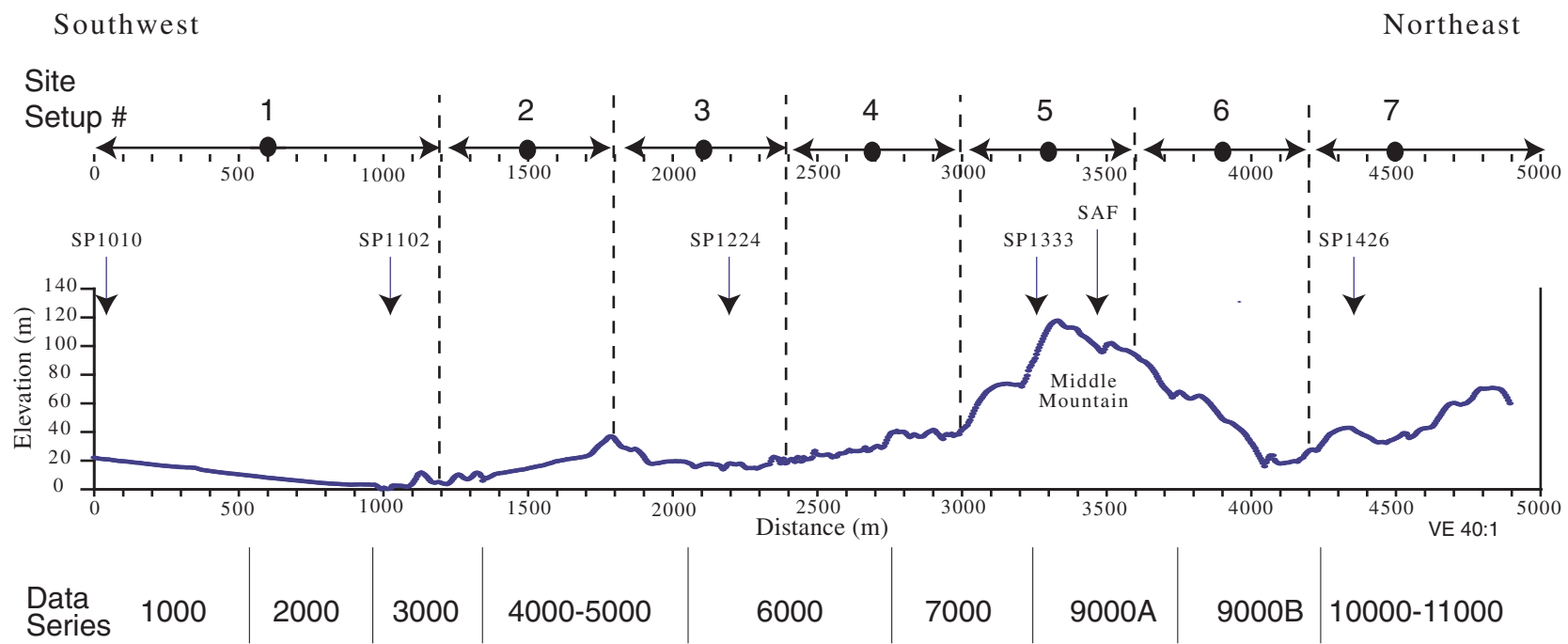


Fig. 1c.

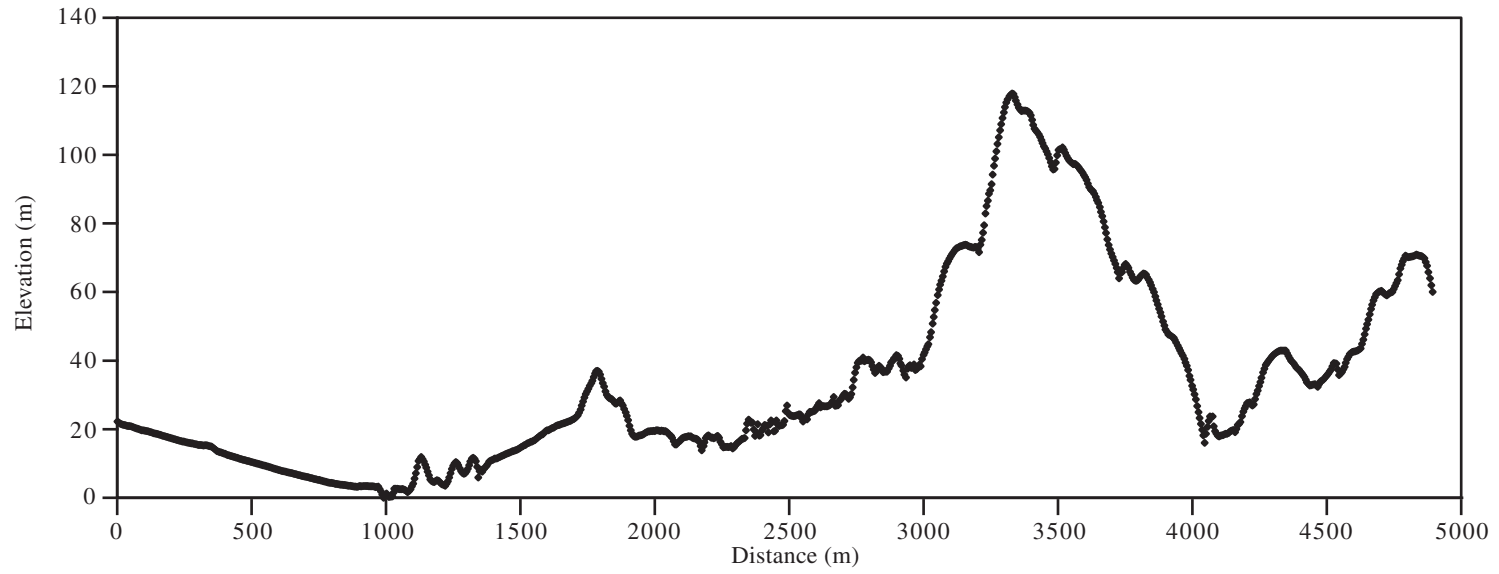


Fig. 2.

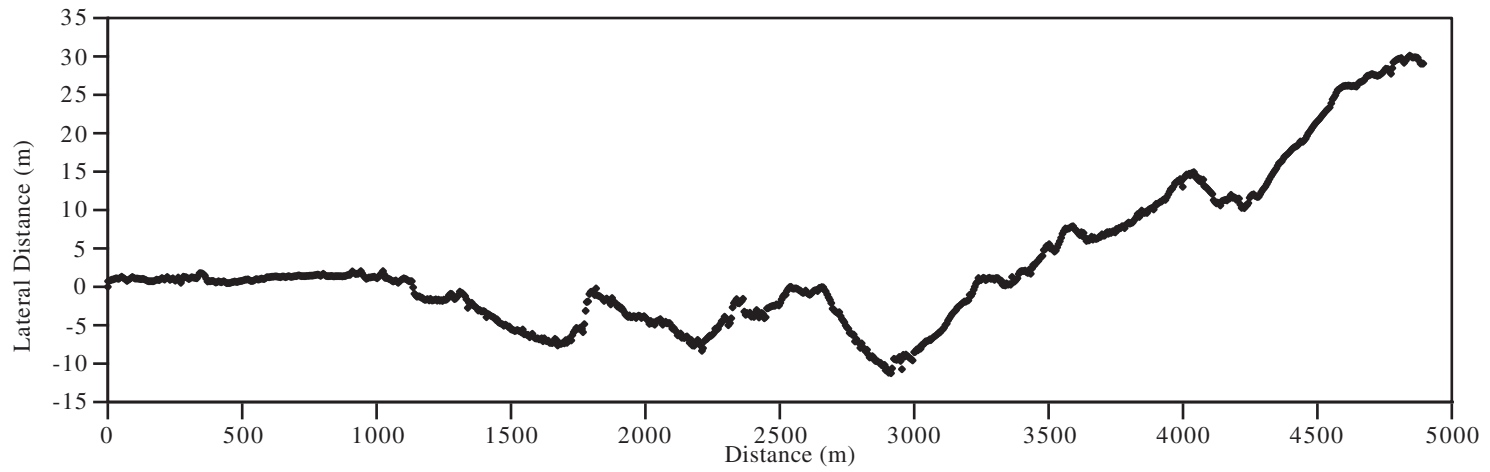


Fig. 3.

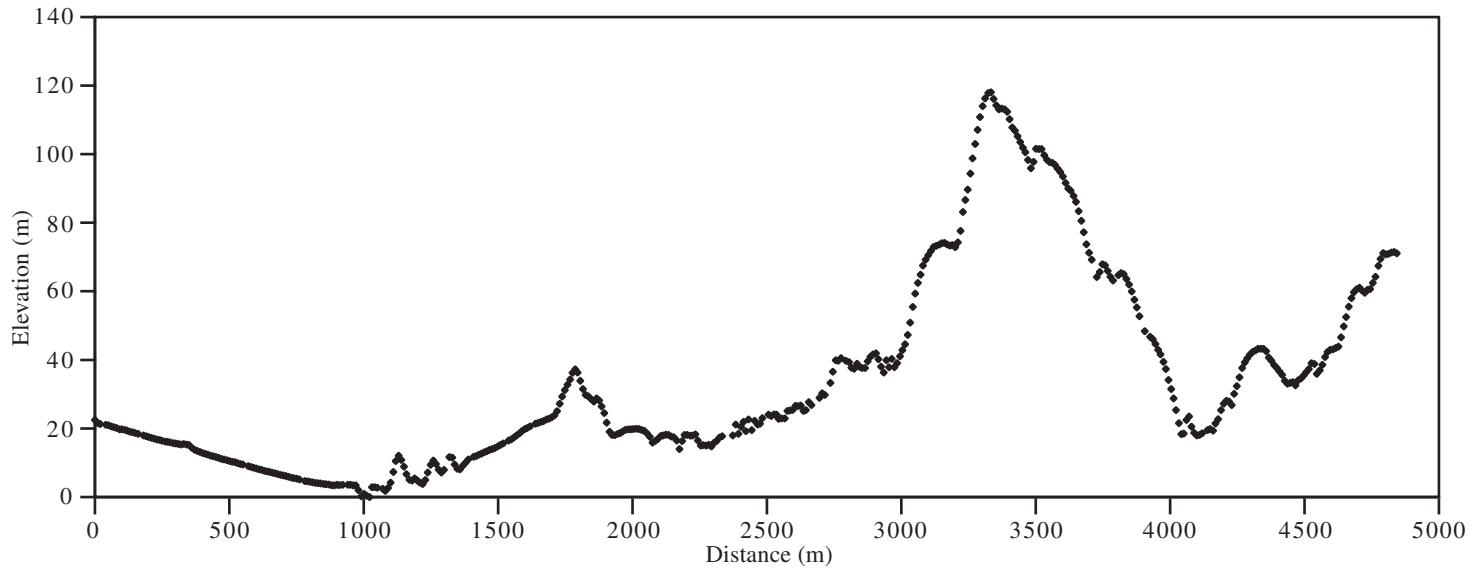


Fig. 4.

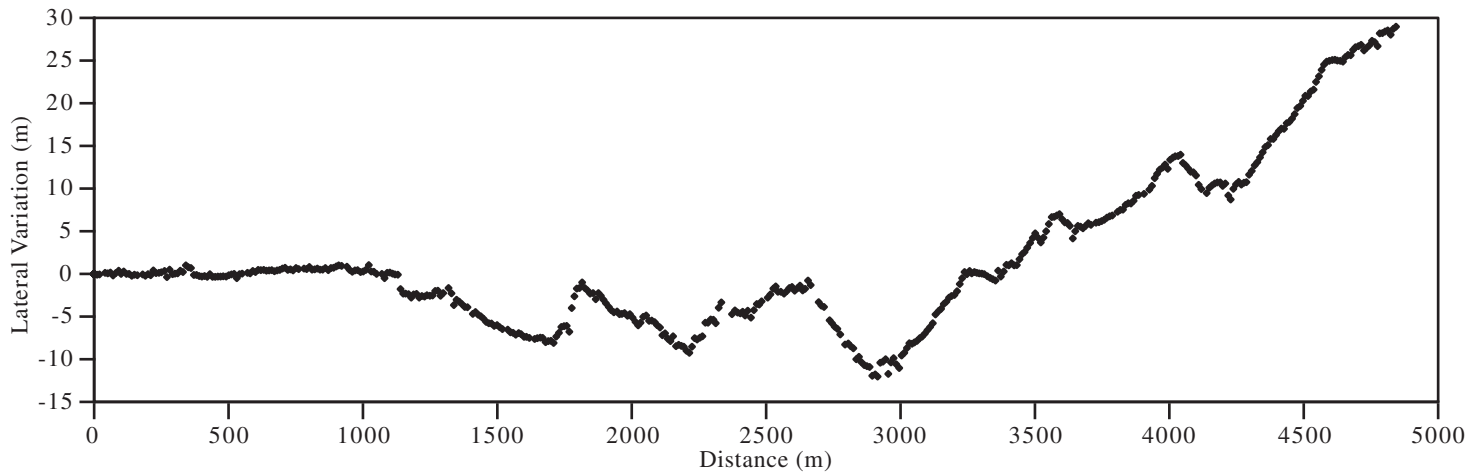


Fig. 5.

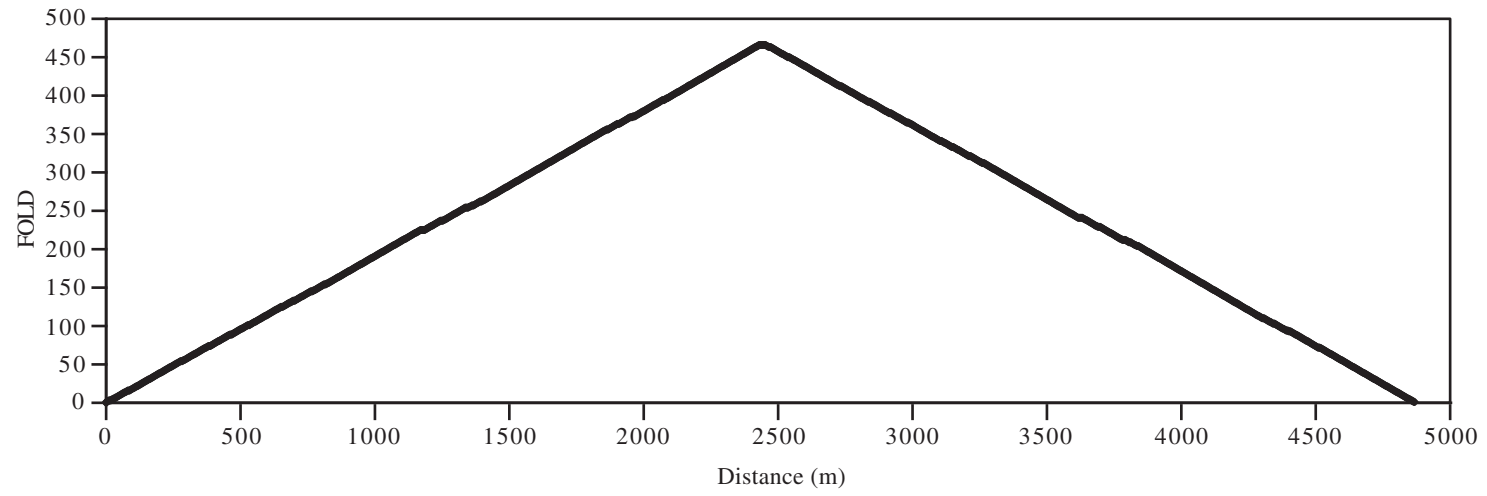


Fig. 6.

Parkfield - Line 1 FFID 1010

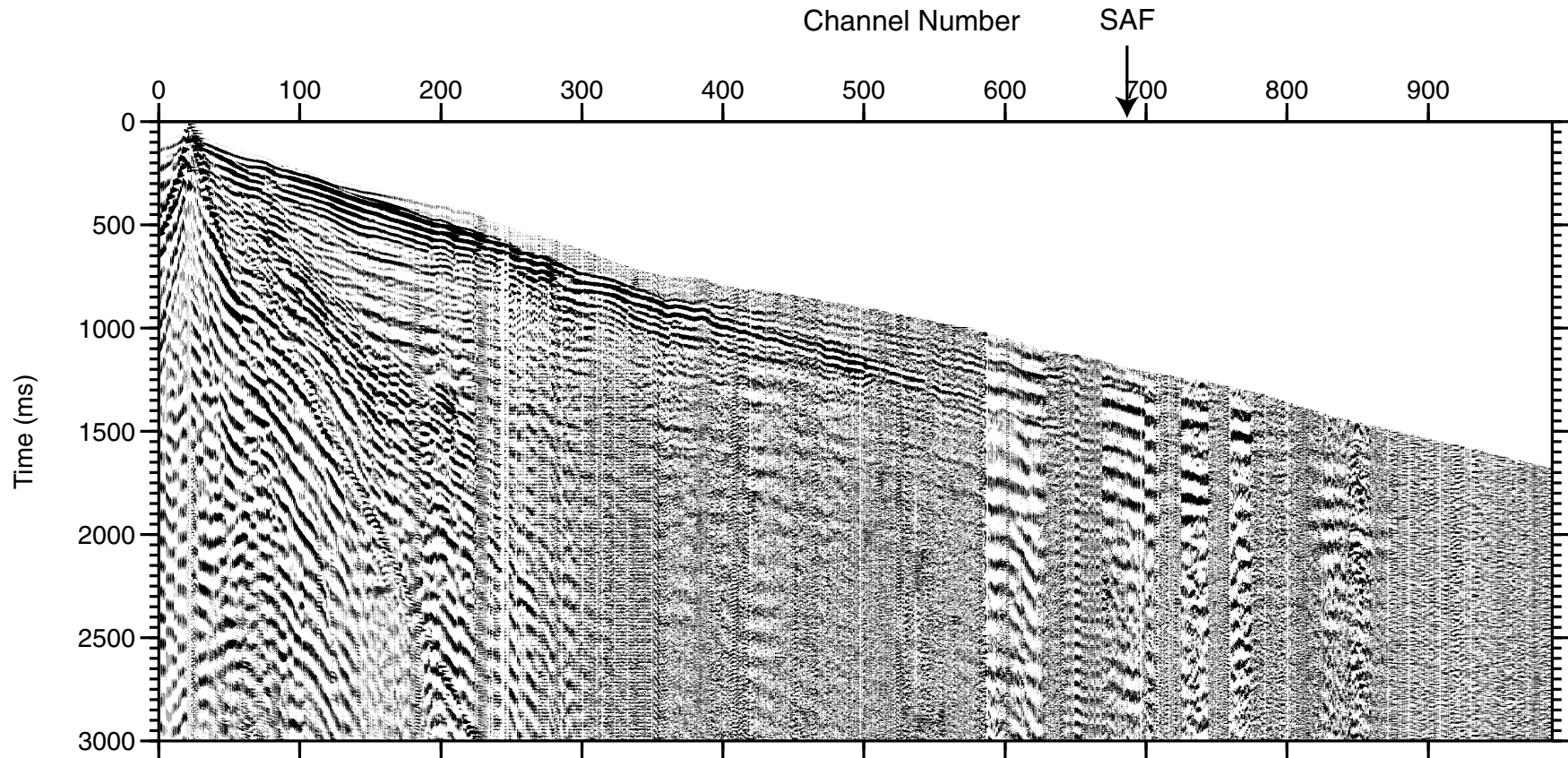


Figure 7.

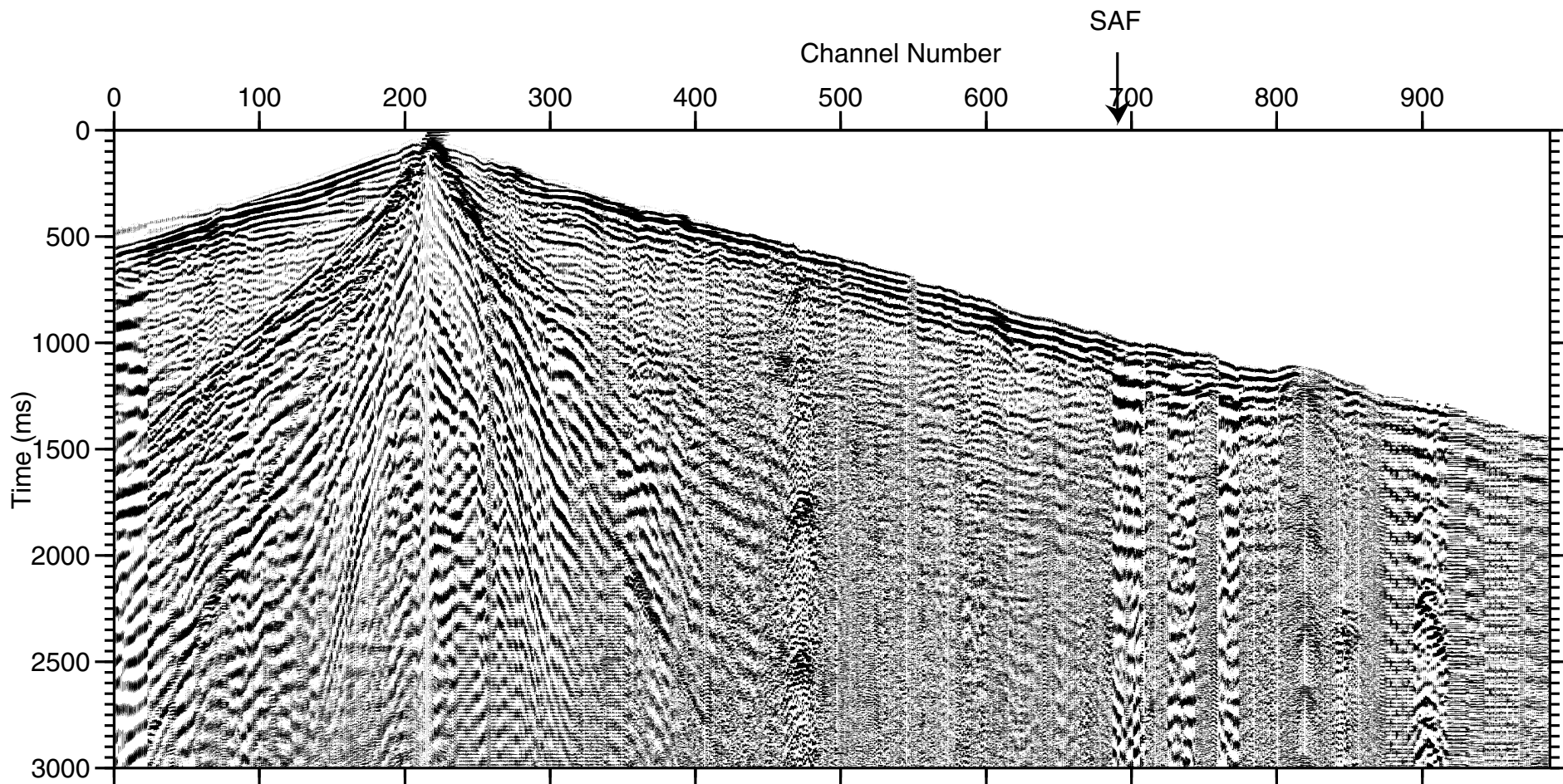


Figure 8.

Parkfield - Line 1 FFID 1224

Channel Number

SAF

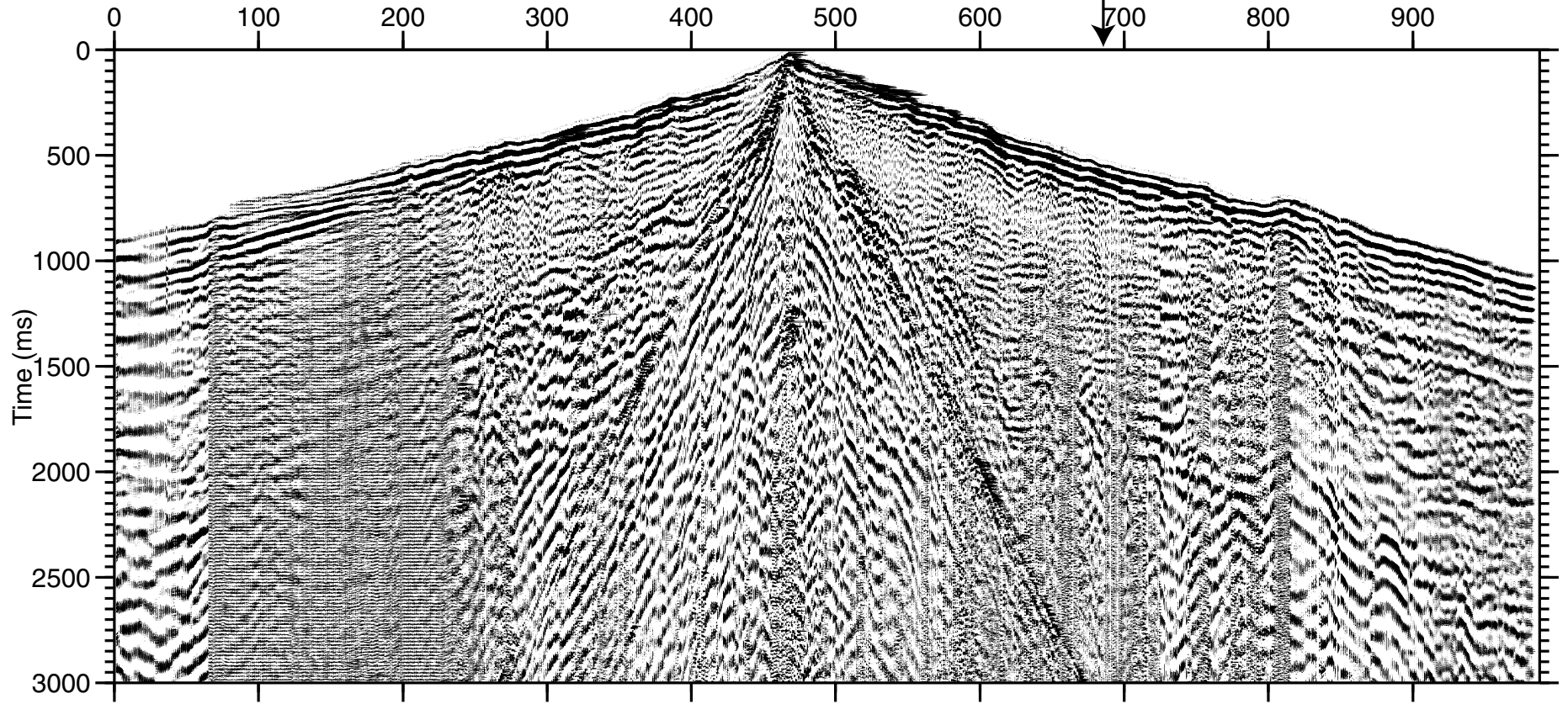


Figure 9.

Parkfield - Line 1 FFID 1333

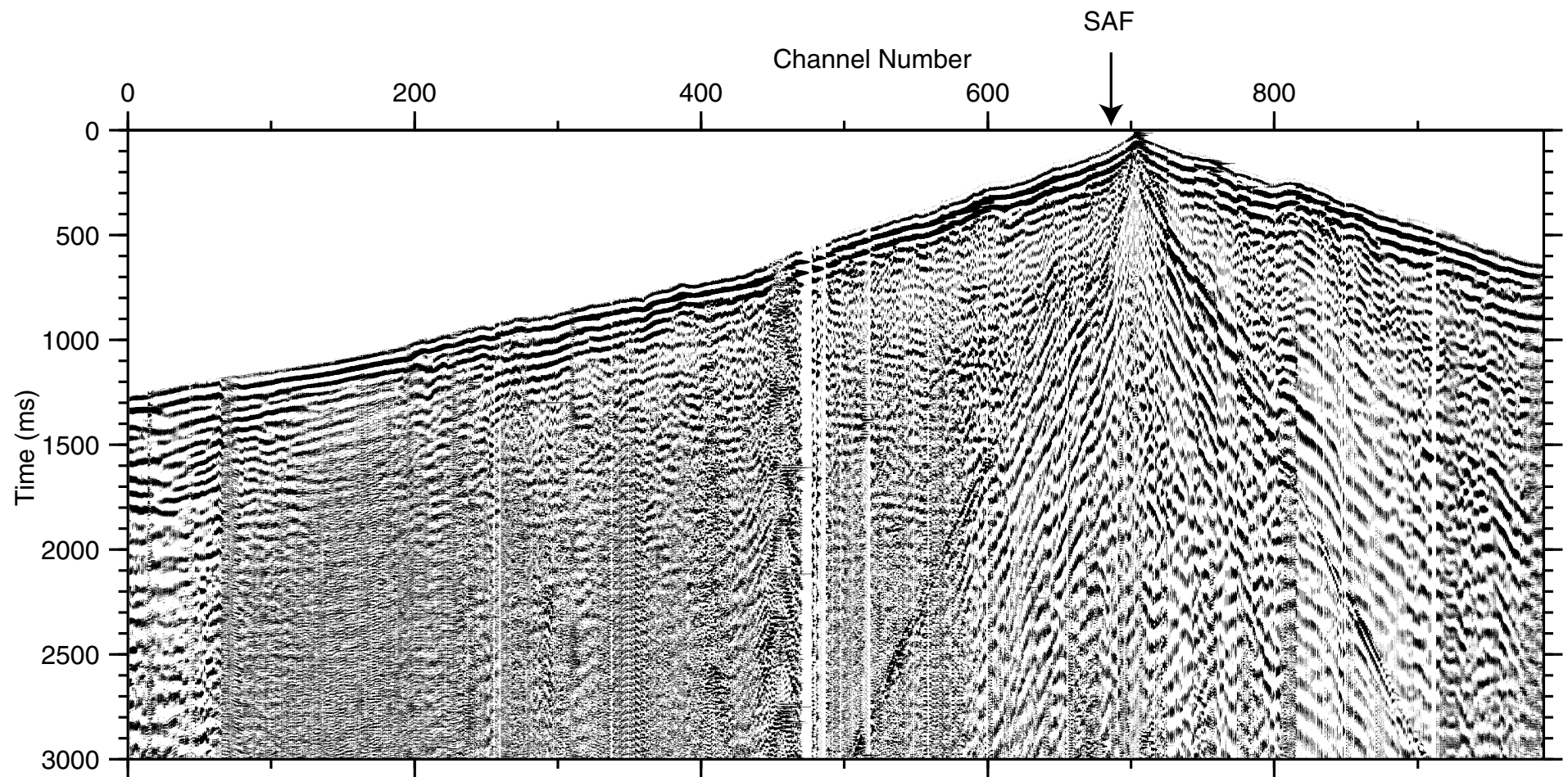


Figure 10.

Parkfield - Line 1FFID 1426

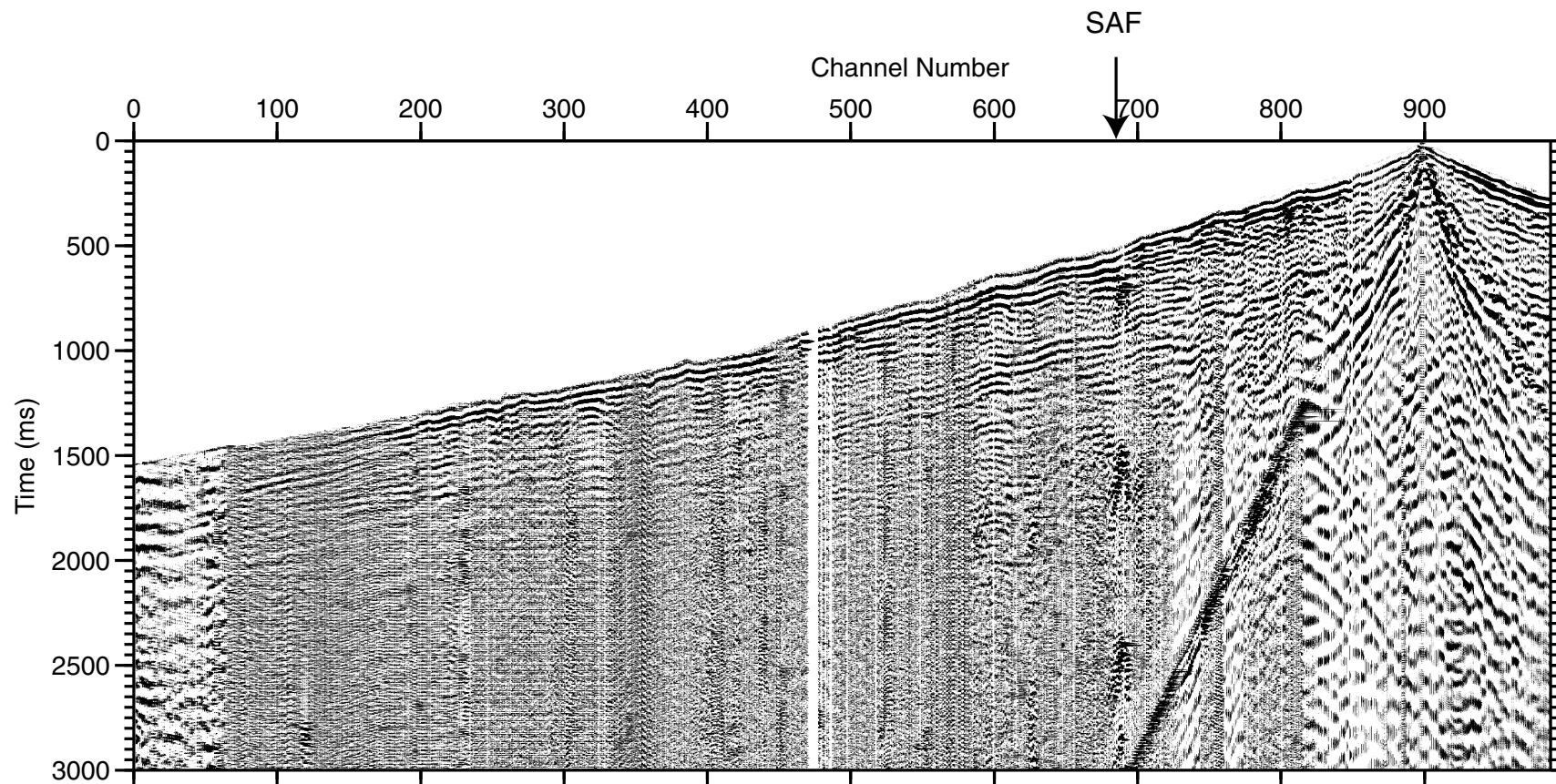


Figure 11.

Appendix A

Relative locations and elevations of shots and geophones along main line of Parkfield seismic line.
Distance and lateral variation measurements are relative to first shot, elevation is relative to lowest shot.

Shot/Geophone number	Geophone distance (m)	Shot distance (m)	Geophone elevation (m)	Shot elevation (m)	Lateral geophone variation (m)	Lateral shot variation (m)
1	0.14	0.00	22.27	22.44	0.72	0.00
2	5.43		21.96		0.80	
3	10.73	10.72	21.65	21.57	0.88	-0.11
4	15.73		21.49		0.92	
5	20.73	20.41	21.33	21.30	0.96	-0.08
6	25.76		21.22		1.03	
7	30.79		21.11		1.10	
8	35.75		21.03		1.06	
9	40.70	40.37	20.95	21.07	1.02	0.12
10	45.72		20.90		1.16	
11	50.73	50.64	20.85	20.91	1.31	0.05
12	55.69		20.68		1.19	
13	60.66	60.79	20.52	20.62	1.08	0.16
14	65.67		20.39		0.93	
15	70.68	70.71	20.25	20.37	0.77	-0.18
16	75.67		20.11		0.89	
17	80.65	80.39	19.96	20.14	1.01	0.09
18	85.62		19.83		1.14	
19	90.58	90.96	19.70	19.78	1.27	0.36
20	95.64		19.64		1.16	
21	100.69	100.24	19.58	19.74	1.06	0.00
22	105.53		19.51		1.07	
23	110.37	110.74	19.44	19.58	1.08	0.27
24	115.51		19.33		1.04	
25	120.64	120.52	19.21	19.36	1.00	0.00
26	125.67		19.10		1.01	
27	130.69	130.43	18.99	19.08	1.03	0.00
28	135.69		18.85		0.96	
29	140.70	140.31	18.71	18.89	0.90	-0.22
30	145.71		18.64		0.81	
31	150.72	150.10	18.56	18.67	0.73	-0.10
32	155.75		18.45		0.73	
33	160.79	160.49	18.33	18.40	0.72	-0.17
34	165.76		18.19		0.73	
35	170.74		18.04		0.73	
36	175.77		17.92		0.84	
37	180.80	180.49	17.79	17.95	0.95	-0.07
38	185.81		17.69		0.90	
39	190.82	190.55	17.58	17.76	0.85	-0.22
40	195.78		17.46		1.00	
41	200.74	200.65	17.34	17.47	1.14	-0.04
42	205.76		17.23		1.04	
43	210.77	210.41	17.13	17.26	0.94	-0.15
44	215.83		17.01		1.11	
45	220.89	220.45	16.89	17.06	1.28	0.41
46	225.93		16.77		1.09	
47	230.98	230.54	16.65	16.80	0.91	0.10
48	236.44		16.54		1.01	

49	241.90	241.25	16.44	16.62	1.11	0.11
50	246.46		16.38		0.95	
51	251.03	250.24	16.32	16.44	0.79	0.18
52	256.14		16.20		1.00	
53	261.25	261.82	16.07	16.18	1.21	0.34
54	266.12		15.99		0.86	
55	270.99	270.63	15.90	16.06	0.51	-0.37
56	275.73		15.86		0.91	
57	280.47	280.56	15.83	15.91	1.31	0.51
58	285.76		15.72		1.28	
59	291.04	291.37	15.61	15.68	1.26	-0.04
60	295.99		15.52		1.13	
61	300.94	300.57	15.43	15.62	1.00	0.02
62	306.01		15.43		1.12	
63	311.07	310.52	15.42	15.49	1.24	0.07
64	316.04		15.33		1.20	
65	321.02	320.51	15.25	15.32	1.17	0.36
66	326.02		15.28		1.13	
67	331.02	330.71	15.31	15.43	1.10	0.23
68	335.88		15.21		1.43	
69	340.75	340.96	15.11	15.29	1.75	1.00
70	345.63		15.03		1.75	
71	350.51	350.55	14.95	15.12	1.74	0.78
72	355.49		14.63		1.61	
73	360.47	360.70	14.30	14.41	1.47	0.67
74	365.71		13.97		1.08	
75	370.95	371.06	13.64	13.78	0.68	-0.13
76	376.18		13.47		0.71	
77	381.41	381.32	13.30	13.41	0.73	-0.14
78	386.23		13.20		0.75	
79	391.04	391.19	13.09	13.11	0.77	-0.24
80	396.04		12.94		0.66	
81	401.05	400.72	12.79	12.85	0.54	-0.31
82	406.06		12.63		0.62	
83	411.08	410.62	12.47	12.57	0.71	-0.26
84	416.12		12.36		0.64	
85	421.17	421.23	12.24	12.33	0.58	-0.35
86	426.16		12.11		0.65	
87	431.15	430.61	11.98	12.08	0.72	-0.05
88	436.12		11.86		0.61	
89	441.10	440.75	11.75	11.88	0.49	-0.36
90	446.12		11.63		0.48	
91	451.14	450.60	11.50	11.64	0.48	-0.36
92	456.12		11.38		0.53	
93	461.10	460.90	11.27	11.41	0.58	-0.32
94	466.10		11.15		0.63	
95	471.10	470.58	11.04	11.10	0.68	-0.33
96	476.10		10.94		0.66	
97	481.09	480.65	10.84	10.92	0.63	-0.30
98	486.08		10.74		0.68	
99	491.08	491.13	10.64	10.73	0.72	-0.33
100	496.09		10.51		0.75	
101	501.10	500.65	10.38	10.51	0.78	-0.15
102	506.12		10.28		0.85	

103	511.14	510.58	10.18	10.28	0.92	-0.06
104	516.11		10.06		0.95	
105	521.08	520.57	9.95	10.19	0.97	0.01
106	526.08		9.84		0.87	
107	531.07	530.80	9.74	9.86	0.77	-0.49
108	536.08		9.62		0.77	
109	541.09	540.66	9.51	9.60	0.78	-0.02
110	546.08		9.41		0.89	
111	551.06	550.96	9.31	9.45	1.01	0.03
112	556.08		9.18		0.97	
113	561.11		9.06		0.92	
114	566.11		8.95		1.00	
115	571.11	570.64	8.83	9.00	1.08	0.12
116	576.04		8.71		1.04	
117	580.98	580.74	8.58	8.77	1.00	0.06
118	586.01		8.46		1.12	
119	591.03	590.52	8.33	8.53	1.23	0.34
120	596.09		8.20		1.24	
121	601.15	600.73	8.07	8.30	1.25	0.23
122	606.15		7.98		1.27	
123	611.16	610.73	7.88	8.09	1.30	0.48
124	616.16		7.80		1.32	
125	621.17	620.56	7.73	7.91	1.35	0.42
126	626.15		7.60		1.34	
127	631.13	630.75	7.48	7.64	1.33	0.47
128	636.16		7.40		1.29	
129	641.19	640.53	7.32	7.48	1.25	0.36
130	646.15		7.23		1.31	
131	651.11	650.63	7.14	7.29	1.36	0.40
132	656.12		7.02		1.31	
133	661.13	660.38	6.90	7.06	1.25	0.43
134	666.12		6.80		1.32	
135	671.12	670.62	6.71	6.88	1.40	0.30
136	676.15		6.60		1.34	
137	681.18	680.81	6.49	6.70	1.29	0.40
138	686.15		6.40		1.32	
139	691.12	690.70	6.30	6.43	1.35	0.47
140	696.14		6.22		1.38	
141	701.17	700.46	6.13	6.31	1.40	0.61
142	706.18		6.04		1.44	
143	711.19	710.75	5.95	6.11	1.49	0.71
144	716.17		5.85		1.43	
145	721.16	720.65	5.75	5.90	1.37	0.46
146	726.16		5.65		1.38	
147	731.17	730.50	5.55	5.69	1.38	0.54
148	736.19		5.44		1.39	
149	741.21	740.70	5.32	5.50	1.41	0.41
150	746.18		5.24		1.43	
151	751.16	750.72	5.17	5.36	1.44	0.69
152	756.18		5.06		1.45	
153	761.20	760.72	4.96	5.13	1.45	0.56
154	766.21		4.84		1.49	
155	771.21		4.73		1.52	
156	776.21		4.63		1.56	

157	781.22	780.51	4.54	4.68	1.59	0.62
158	786.20		4.46		1.51	
159	791.19	790.58	4.37	4.58	1.43	0.55
160	796.20		4.32		1.56	
161	801.21	800.85	4.26	4.46	1.69	0.81
162	806.21		4.17		1.56	
163	811.20	810.39	4.07	4.27	1.42	0.49
164	816.23		4.01		1.40	
165	821.25	820.59	3.96	4.15	1.38	0.53
166	826.25		3.90		1.39	
167	831.25	830.65	3.84	4.04	1.41	0.63
168	836.25		3.80		1.38	
169	841.25	840.64	3.76	3.97	1.34	0.51
170	846.26		3.70		1.37	
171	851.27	850.83	3.63	3.82	1.39	0.50
172	856.24		3.56		1.39	
173	861.22	860.63	3.50	3.69	1.40	0.67
174	866.28		3.46		1.38	
175	871.34	870.78	3.41	3.68	1.35	0.42
176	876.27		3.35		1.38	
177	881.19	880.79	3.29	3.43	1.40	0.67
178	886.11		3.24		1.47	
179	891.04	891.08	3.20	3.44	1.54	0.70
180	896.19		3.29		1.55	
181	901.35	900.80	3.38	3.57	1.56	0.88
182	905.57		3.36		1.79	
183	909.79	909.68	3.34	3.52	2.02	1.01
184	915.58		3.39		1.84	
185	921.38	921.27	3.44	3.57	1.66	0.94
186	926.45		3.41		1.68	
187	931.52		3.38		1.70	
188	936.31		3.35		1.87	
189	941.09	940.62	3.33	3.54	2.04	0.84
190	945.97		3.34		1.73	
191	950.84	950.28	3.35	3.54	1.43	0.47
192	955.98		3.24		1.23	
193	961.12	960.17	3.14	3.39	1.04	0.26
194	965.86		3.20		1.12	
195	970.59	970.66	3.26	3.42	1.20	0.39
196	975.77		2.57		1.22	
197	980.94	980.58	1.87	2.01	1.24	0.42
198	986.05		0.94		1.29	
199	991.17	990.82	0.00	0.24	1.33	0.23
200	996.22		0.63		1.22	
201	1001.27	1000.70	1.25	0.94	1.10	0.27
202	1006.12		0.73		1.28	
203	1010.96	1010.60	0.20	0.35	1.46	0.45
204	1017.24		0.28		1.75	
205	1023.51	1022.13	0.36	0.01	2.05	1.03
206	1027.17		1.49		1.61	
207	1030.83	1030.59	2.63	2.85	1.17	0.28
208	1035.85		2.64		1.13	
209	1040.87	1040.66	2.65	2.83	1.09	0.26
210	1045.85		2.56		1.01	

211	1050.83	1050.68	2.48	2.68	0.93	0.00
212	1055.82		2.50		0.81	
213	1060.80		2.53		0.70	
214	1065.82		2.37		0.76	
215	1070.83	1070.52	2.21	2.40	0.82	0.00
216	1075.60		1.90		0.67	
217	1080.37	1080.53	1.60	1.81	0.53	-0.49
218	1085.53		2.05		0.71	
219	1090.70	1090.76	2.51	2.62	0.90	0.11
220	1095.72		3.30		1.00	
221	1100.74	1100.59	4.10	4.21	1.10	0.14
222	1105.59		5.61		1.03	
223	1110.44	1110.60	7.13	7.27	0.96	0.04
224	1115.50		8.92		0.83	
225	1120.57	1119.64	10.70	10.52	0.71	-0.07
226	1125.44		11.30		0.72	
227	1130.32	1129.74	11.91	12.07	0.74	-0.09
228	1135.37		11.25		-0.09	
229	1140.42	1139.76	10.60	10.81	-0.92	-1.77
230	1145.15		9.67		-1.10	
231	1149.87	1149.70	8.75	8.86	-1.28	-2.31
232	1154.73		7.64		-1.27	
233	1159.59	1159.28	6.52	6.66	-1.26	-2.33
234	1164.41		5.39		-1.39	
235	1169.45	1169.37	4.87	5.07	-1.43	-2.37
236	1174.63		4.66		-1.61	
237	1179.52	1179.30	4.59	4.85	-1.69	-2.77
238	1184.52		4.92		-1.66	
239	1189.51	1189.13	5.15	5.44	-1.61	-2.40
240	1194.69		4.97		-1.78	
241	1199.61	1199.49	4.50	4.84	-1.55	-2.35
242	1204.52		4.13		-1.76	
243	1209.44	1209.27	3.87	4.16	-1.77	-2.78
244	1214.57		3.73		-1.70	
245	1219.62	1219.47	3.53	3.78	-1.64	-2.60
246	1224.68		4.14		-1.82	
247	1229.60	1229.15	4.81	4.97	-1.68	-2.66
248	1234.41		5.87		-1.80	
249	1239.45	1238.59	7.18	7.14	-1.74	-2.49
250	1244.28		8.36		-1.85	
251	1249.19	1248.75	9.33	9.42	-1.66	-2.58
252	1254.15		10.05		-1.71	
253	1259.21	1259.04	10.41	10.63	-1.67	-2.55
254	1264.18		10.12		-1.53	
255	1268.78	1269.08	9.46	9.67	-1.13	-2.01
256	1274.06		8.51		-0.91	
257	1279.16	1279.09	7.75	7.97	-0.94	-1.97
258	1283.94		7.25		-1.23	
259	1288.96	1289.03	6.98	7.16	-1.60	-2.58
260	1294.04		7.15		-1.54	
261	1299.05	1298.61	7.73	7.94	-1.26	-2.25
262	1303.91		8.46		-1.10	
263	1308.89		9.45		-0.63	
264	1313.64		10.56		-0.78	

265	1318.73	1318.94	11.46	11.66	-0.84	-1.65
266	1323.70		11.66		-1.04	
267	1328.72	1329.15	11.32	11.48	-1.23	-2.28
268	1333.60		10.63		-1.62	
269	1338.79	1338.24	9.00	9.44	-2.75	-3.65
270	1342.91		5.92		-2.05	
271	1348.29	1348.35	7.76	8.26	-2.15	-3.05
272	1353.37		8.13		-2.10	
273	1358.05	1358.51	7.59	8.08	-2.41	-3.26
274	1363.33		8.40		-2.55	
275	1368.02	1368.81	8.84	9.20	-2.60	-3.56
276	1373.37		9.24		-2.83	
277	1377.87	1378.79	9.79	10.04	-3.08	-3.87
278	1383.50		10.59		-3.04	
279	1388.51	1389.15	10.78	10.99	-3.21	-3.90
280	1393.45		10.99		-3.20	
281	1398.54		11.13		-3.17	
282	1403.56		11.41		-3.26	
283	1408.52	1409.32	11.43	11.70	-3.95	-4.69
284	1413.60		11.52		-3.54	
285	1418.23	1419.22	11.75	12.00	-3.60	-4.47
286	1423.57		11.92		-3.74	
287	1428.42	1428.88	12.10	12.33	-3.85	-4.80
288	1433.45		12.27		-3.93	
289	1438.50	1438.93	12.44	12.68	-4.03	-4.98
290	1443.46		12.64		-4.30	
291	1448.47	1448.67	12.80	13.07	-4.25	-5.24
292	1453.50		12.96		-4.62	
293	1458.34	1458.58	13.11	13.33	-4.72	-5.64
294	1463.41		13.31		-4.79	
295	1468.42	1468.53	13.49	13.72	-4.90	-5.79
296	1473.34		13.59		-5.08	
297	1478.34	1478.77	13.72	13.97	-4.92	-5.81
298	1483.41		13.88		-5.04	
299	1488.39	1488.62	14.08	14.31	-5.20	-6.09
300	1493.30		14.28		-5.19	
301	1498.43	1498.77	14.54	14.78	-5.52	-6.00
302	1503.40		14.85		-5.60	
303	1508.37	1508.80	15.00	15.23	-5.63	-6.25
304	1513.49		15.35		-5.77	
305	1518.48	1518.80	15.42	15.64	-5.71	-6.46
306	1523.51		15.75		-5.64	
307	1528.52		15.91		-5.75	
308	1533.37		16.10		-5.79	
309	1538.26	1538.85	16.31	16.45	-5.94	-6.55
310	1543.69		16.44		-5.57	
311	1548.27	1548.96	16.63	16.78	-6.17	-6.84
312	1553.34		16.78		-6.16	
313	1558.59	1558.93	17.19	17.30	-6.25	-6.91
314	1563.44		17.51		-6.24	
315	1568.71	1568.74	17.85	17.98	-6.57	-7.13
316	1573.48		18.09		-6.34	
317	1578.56	1579.11	18.39	18.60	-6.11	-6.94
318	1583.15		18.54		-6.51	

319	1588.52	1588.94	19.06	19.31	-6.72	-7.08
320	1593.49		19.46		-6.73	
321	1598.61	1598.97	19.65	19.84	-6.71	-7.37
322	1603.64		19.70		-6.84	
323	1608.44	1608.65	19.92	20.14	-6.84	-7.38
324	1613.51		20.13		-6.71	
325	1618.63	1619.14	20.34	20.57	-7.10	-7.51
326	1623.70		20.46		-6.69	
327	1628.49		20.79		-7.03	
328	1633.46		20.97		-7.09	
329	1638.45	1639.02	21.16	21.41	-7.03	-7.62
330	1643.52		21.20		-7.30	
331	1648.34	1648.92	21.39	21.64	-7.28	-7.54
332	1653.72		21.53		-7.32	
333	1658.97	1659.65	21.66	21.93	-7.11	-7.47
334	1663.36		21.79		-6.77	
335	1668.15	1669.17	21.89	22.19	-6.92	-7.49
336	1673.07		22.08		-7.64	
337	1678.11	1679.32	22.23	22.59	-7.29	-8.01
338	1683.78		22.41		-7.43	
339	1688.61	1689.31	22.56	22.83	-7.39	-7.88
340	1693.27		22.78		-7.28	
341	1698.21	1699.37	22.96	23.24	-7.37	-7.85
342	1702.91		23.26		-6.96	
343	1708.32	1709.41	23.66	23.82	-7.29	-8.11
344	1712.89		24.06		-6.82	
345	1718.23	1719.27	24.81	25.05	-6.98	-7.34
346	1723.38		25.77		-6.98	
347	1727.96	1728.95	26.91	27.19	-6.29	-6.90
348	1732.89		28.10		-5.92	
349	1737.71	1738.45	29.20	29.30	-5.65	-6.22
350	1742.81		30.23		-5.36	
351	1747.41	1748.13	31.06	31.17	-5.44	-6.14
352	1752.47		31.82		-5.47	
353	1757.52	1758.10	32.62	32.73	-5.33	-6.10
354	1763.16		33.45		-5.49	
355	1767.37	1767.82	34.17	34.27	-5.90	-6.77
356	1772.27		35.20		-4.87	
357	1776.95	1776.60	36.23	36.25	-3.12	-3.99
358	1781.70		36.94		-2.00	
359	1786.20	1786.78	37.05	37.23	-1.91	-2.63
360	1791.55		36.75		-0.93	
361	1796.24	1796.11	35.94	36.32	-0.66	-1.73
362	1801.15		34.68		-0.64	
363	1806.07	1806.16	33.43	33.91	-0.62	-1.66
364	1810.94		32.42		-1.09	
365	1815.68	1815.68	31.01	31.48	-0.20	-0.99
366	1821.15		30.05		-1.11	
367	1825.97	1825.46	29.38	29.80	-1.20	-1.66
368	1831.09		29.02		-1.27	
369	1836.23	1835.51	28.95	29.40	-1.43	-1.93
370	1841.11		28.68		-1.54	
371	1846.18	1845.58	28.15	28.61	-1.84	-2.31
372	1851.37		27.51		-1.62	

373	1856.29	1855.88	27.44	27.83	-1.53	-2.25
374	1859.58		27.67		-1.71	
375	1866.28	1866.69	28.22	28.76	-2.02	-2.96
376	1870.91		28.37		-2.28	
377	1875.86	1875.88	27.56	28.13	-1.46	-2.26
378	1881.06		26.92		-1.89	
379	1885.91	1885.05	25.90	26.43	-2.06	-2.56
380	1891.05		24.87		-2.23	
381	1895.81	1895.15	23.89	24.46	-2.56	-3.04
382	1900.52		22.59		-2.47	
383	1904.99	1904.07	20.99	21.71	-2.81	-3.44
384	1910.26		19.68		-2.72	
385	1915.12	1914.84	18.66	19.01	-2.95	-3.89
386	1920.09		18.07		-3.26	
387	1924.88	1923.91	17.78	18.13	-3.63	-4.26
388	1930.10		17.84		-3.79	
389	1934.76	1933.81	17.87	18.03	-3.93	-4.50
390	1940.23		18.09		-3.73	
391	1945.27	1945.23	18.17	18.46	-3.98	-4.40
392	1950.13		18.25		-3.96	
393	1955.10	1954.65	18.45	18.67	-3.83	-4.72
394	1960.16		18.68		-3.85	
395	1964.76	1963.77	18.95	19.11	-4.08	-4.70
396	1970.12		19.13		-3.86	
397	1974.98	1973.35	19.32	19.57	-3.77	-4.60
398	1980.17		19.38		-3.84	
399	1984.81	1983.87	19.46	19.74	-4.07	-4.92
400	1989.97		19.47		-3.93	
401	1994.95	1993.57	19.51	19.74	-3.82	-4.71
402	1999.90		19.46		-3.99	
403	2004.88	2003.27	19.64	19.79	-4.22	-5.14
404	2009.93		19.64		-4.42	
405	2014.96	2013.90	19.60	19.87	-4.82	-5.64
406	2019.78		19.46		-4.44	
407	2024.90	2023.69	19.57	19.79	-4.75	-6.02
408	2029.99		19.49		-4.61	
409	2034.15	2032.90	19.33	19.57	-4.93	-5.73
410	2039.80		19.42		-4.53	
411	2044.99	2043.12	19.11	19.35	-4.41	-5.03
412	2050.04		18.77		-4.36	
413	2054.96	2054.09	18.26	18.55	-4.20	-4.87
414	2059.89		18.06		-4.47	
415	2064.59	2064.33	17.46	17.58	-4.92	-5.51
416	2069.83		16.47		-4.72	
417	2074.62	2074.92	15.52	15.85	-4.57	-5.47
418	2080.09		15.53		-4.75	
419	2085.07	2085.03	16.09	16.42	-4.71	-5.65
420	2090.10		16.42		-4.72	
421	2095.02	2094.43	16.64	16.97	-5.04	-6.01
422	2099.80		17.27		-5.44	
423	2104.79	2104.85	17.52	17.81	-5.35	-6.28
424	2109.68		17.62		-5.62	
425	2114.73	2114.29	17.74	17.98	-5.89	-7.18
426	2119.59		17.84		-6.31	

427	2124.79	2124.50	17.96	18.20	-6.21	-6.97
428	2130.15		17.91		-6.07	
429	2134.73	2134.37	17.87	18.12	-6.62	-7.59
430	2139.61		17.49		-6.59	
431	2144.27	2144.23	17.32	17.67	-6.67	-7.89
432	2149.49		17.23		-6.54	
433	2154.49	2154.09	17.16	17.44	-6.45	-7.32
434	2159.43		16.93		-6.81	
435	2164.48	2164.96	16.34	16.46	-7.29	-8.47
436	2169.92		15.06		-6.90	
437	2174.32	2174.70	13.82	14.02	-7.65	-8.33
438	2180.77		15.11		-7.67	
439	2184.30	2184.36	16.19	16.36	-7.47	-8.44
440	2189.35		17.40		-7.30	
441	2194.25	2194.03	17.97	18.11	-6.92	-8.55
442	2199.50		18.18		-7.13	
443	2204.51	2203.87	17.91	18.15	-7.65	-8.99
444	2209.58		17.46		-8.33	
445	2214.43	2214.95	17.55	17.85	-7.98	-9.25
446	2219.29		17.30		-7.08	
447	2224.49	2223.89	17.59	17.97	-6.85	-8.54
448	2229.45		17.91		-6.78	
449	2234.18	2233.89	18.00	18.29	-6.54	-7.54
450	2239.14		17.50		-6.35	
451	2244.11	2243.38	16.36	16.50	-6.40	-7.70
452	2249.20		15.51		-6.21	
453	2254.29	2253.76	14.66	15.02	-6.01	-7.46
454	2259.12		14.77		-5.47	
455	2264.43	2263.35	14.87	15.17	-5.61	-7.33
456	2269.04		14.85		-5.48	
457	2273.80	2273.98	14.80	14.99	-5.09	-5.72
458	2279.04		14.83		-4.84	
459	2283.59	2283.61	15.08	15.25	-4.49	-5.71
460	2288.98		14.41		-4.42	
461	2294.52	2293.91	14.67	14.77	-3.90	-5.34
462	2299.44		15.23		-4.14	
463	2303.51	2303.86	15.70	15.84	-4.28	-5.39
464	2308.68		16.11		-4.99	
465	2313.85	2312.98	16.40	16.32	-4.72	-5.79
466	2319.01		16.83		-4.10	
467	2324.24	2323.48	17.17	17.37	-2.67	-3.97
468	2329.34		17.29		-2.12	
469	2334.22	2333.75	17.42	17.70	-1.88	-3.36
470	2339.16		19.67		-1.59	
471	2343.25		21.61		-2.12	
472	2348.74		22.76		-2.16	
473	2352.91		22.39		-1.92	
474	2358.19		21.87		-1.84	
475	2362.91		21.90		-1.55	
476	2367.64		19.92		-3.25	
477	2372.77	2373.39	18.07	17.94	-3.66	-4.71
478	2377.24		19.08		-3.41	
479	2382.71	2383.71	21.45	21.18	-3.56	-4.30
480	2388.13		18.12		-3.36	

481	2393.03	2393.77	18.25	18.41	-3.88	-4.55
482	2398.21		19.69		-3.75	
483	2403.47	2403.66	20.31	20.42	-3.94	-4.63
484	2408.40		21.23		-3.40	
485	2413.61	2413.22	21.07	21.90	-3.02	-4.43
486	2418.20		21.00		-3.22	
487	2422.31	2422.10	19.04	19.20	-4.00	-4.88
488	2427.06		21.38		-3.54	
489	2432.37	2432.15	22.57	22.60	-3.40	-4.33
490	2437.19		22.12		-3.55	
491	2442.50	2443.95	19.38	19.52	-4.10	-5.13
492	2447.29		19.52		-3.95	
493	2452.25	2454.24	22.56	22.20	-2.83	-4.25
494	2457.10		21.36		-2.79	
495	2462.03	2465.06	20.89	21.15	-2.66	-3.55
496	2467.17		21.13		-2.59	
497	2472.09	2474.70	21.17	21.38	-2.52	-3.59
498	2477.22		21.27		-2.47	
499	2482.20	2482.91	22.38	23.00	-2.46	-3.23
500	2486.70		25.26		-2.31	
501	2491.37		26.94		-2.34	
502	2496.24		24.75		-2.44	
503	2501.32		24.13		-2.09	
504	2506.40	2505.70	23.91	24.01	-1.64	-2.80
505	2511.26		23.88		-1.27	
506	2516.38	2515.83	23.83	23.66	-1.02	-2.42
507	2521.31		23.86		-1.03	
508	2526.33	2526.73	24.01	24.13	-0.51	-1.71
509	2531.38		24.14		-0.25	
510	2536.27	2535.63	24.36	23.99	-0.05	-1.47
511	2541.31		24.23		-0.01	
512	2546.23	2544.23	23.15	22.79	-0.20	-2.10
513	2551.34		22.25		-0.26	
514	2556.33	2554.83	22.92	22.95	-0.21	-2.11
515	2561.36		23.29		-0.23	
516	2566.43	2566.21	22.82	22.92	-0.29	-2.32
517	2571.37		24.32		-0.46	
518	2576.19	2576.12	25.04	25.14	-0.50	-2.02
519	2581.24		25.07		-0.69	
520	2586.21	2586.04	25.10	25.25	-0.82	-1.67
521	2591.24		25.25		-0.75	
522	2596.14	2596.02	25.43	25.44	-0.48	-1.52
523	2601.14		26.30		-0.81	
524	2606.14	2605.94	26.90	26.62	-0.93	-1.97
525	2611.04		27.62		-1.06	
526	2616.03	2616.40	26.35	26.48	-0.94	-1.69
527	2621.00		26.57		-0.73	
528	2625.98	2626.36	26.76	26.64	-0.53	-1.38
529	2631.06		26.67		-0.44	
530	2636.90	2635.72	26.69	25.12	-0.41	-1.94
531	2641.01		26.66		-0.55	
532	2646.91	2644.98	26.80	25.34	-0.14	-1.75
533	2650.99		27.04		-0.17	
534	2655.93	2655.88	27.53	27.68	-0.05	-0.78

535	2660.92		28.12		-0.07	
536	2665.59	2665.72	29.38	26.86	-0.40	-1.33
537	2670.71		26.81		-0.58	
538	2675.84		26.92		-1.02	
539	2680.96		26.98		-1.39	
540	2685.70		28.27		-1.71	
541	2690.68		28.65		-2.14	
542	2695.82	2695.22	29.17	28.94	-2.85	-3.32
543	2700.20		29.80		-2.94	
544	2705.29	2705.79	30.31	30.23	-3.21	-3.71
545	2710.23		30.22		-3.32	
546	2715.35	2715.57	29.80	29.79	-3.44	-3.89
547	2720.42		28.83		-3.30	
548	2725.69		29.30		-3.83	
549	2730.40		30.26		-4.20	
550	2735.37	2736.26	32.23	33.26	-4.42	-5.45
551	2740.19		34.36		-4.64	
552	2745.02	2745.25	36.46	36.54	-5.05	-5.78
553	2750.07		38.01		-5.33	
554	2754.45	2755.63	39.37	39.87	-5.46	-6.20
555	2759.17		39.90		-6.01	
556	2764.44	2765.18	39.97	39.77	-6.04	-6.45
557	2769.22		39.95		-6.24	
558	2774.54	2775.52	40.92	40.51	-6.21	-7.11
559	2779.33		39.83		-7.13	
560	2784.10		40.08		-6.80	
561	2789.15		40.11		-7.17	
562	2794.26	2794.24	40.25	39.72	-7.29	-8.28
563	2799.36		40.14		-7.95	
564	2804.15	2805.63	39.50	39.36	-7.38	-8.15
565	2809.17		38.43		-7.88	
566	2814.10	2814.74	37.40	37.73	-8.17	-8.48
567	2819.15		36.40		-8.42	
568	2824.20	2824.97	36.89	37.44	-8.19	-8.71
569	2829.14		37.95		-8.84	
570	2834.12	2835.26	38.46	38.87	-9.20	-10.01
571	2839.18		38.07		-9.17	
572	2844.04	2845.10	37.64	37.91	-9.02	-9.73
573	2849.27		36.65		-9.20	
574	2854.16	2854.67	36.76	37.60	-9.62	-10.36
575	2859.16		36.78		-9.68	
576	2864.20	2865.07	36.80	37.62	-9.70	-10.69
577	2869.25		37.70		-9.91	
578	2874.21	2875.26	38.53	39.55	-9.91	-10.82
579	2879.10		39.46		-10.23	
580	2884.03	2885.45	39.92	40.87	-10.21	-10.92
581	2889.10		40.66		-10.18	
582	2893.69	2895.04	40.63	41.62	-10.88	-11.93
583	2898.93		41.58		-10.68	
584	2904.06	2905.46	41.35	41.95	-11.17	-11.80
585	2908.94		40.48		-10.98	
586	2913.51	2914.85	39.23	40.17	-11.24	-12.05
587	2917.55		38.58		-10.64	
588	2924.12	2924.80	37.07	37.99	-9.38	-10.41

589	2928.58		35.91		-9.46	
590	2933.72	2934.43	35.07	36.33	-9.52	-10.28
591	2939.84		37.61		-9.45	
592	2944.41	2944.20	38.36	39.89	-9.13	-10.00
593	2948.85		38.62		-9.67	
594	2953.96	2954.86	37.84	37.84	-10.74	-11.73
595	2958.98		38.34		-8.87	
596	2964.15	2964.58	38.90	40.30	-9.09	-10.38
597	2969.10		37.23		-8.81	
598	2974.14	2974.75	37.50	37.90	-9.01	-9.87
599	2979.19		38.03		-9.13	
600	2983.91	2984.75	38.79	39.07	-9.32	-10.60
601	2989.25		38.34		-9.43	
602	2994.19	2994.91	40.46	41.02	-9.59	-11.04
603	2999.26		41.67		-8.51	
604	3004.12	3004.36	42.35	42.87	-8.48	-9.56
605	3009.07		43.28		-8.18	
606	3014.05	3013.97	44.16	44.56	-8.28	-9.26
607	3018.03		44.78		-7.97	
608	3023.43	3023.92	46.81	47.28	-8.06	-8.70
609	3027.68		48.26		-7.58	
610	3033.11	3032.82	50.75	50.88	-7.52	-8.13
611	3037.34		52.76		-7.39	
612	3041.61	3042.37	54.77	55.45	-7.13	-8.20
613	3046.48		56.84		-7.09	
614	3052.19	3051.94	59.13	59.37	-7.01	-8.02
615	3056.93		60.70		-6.85	
616	3061.64	3061.58	62.11	62.45	-6.95	-7.85
617	3066.50		63.31		-6.75	
618	3071.17	3071.15	64.53	64.85	-6.56	-7.55
619	3076.14		65.99		-6.48	
620	3081.10	3080.87	67.34	67.52	-6.31	-7.36
621	3085.78		68.28		-6.20	
622	3090.83	3090.93	68.99	69.20	-5.98	-7.01
623	3095.56		69.75		-5.94	
624	3100.85	3100.85	70.42	70.56	-5.68	-6.59
625	3105.86		71.07		-5.57	
626	3110.70	3110.59	71.65	71.78	-5.30	-6.22
627	3115.90		72.14		-4.98	
628	3120.77	3120.52	72.70	72.94	-4.78	-5.77
629	3125.84		72.89		-4.37	
630	3130.74	3130.15	73.07	73.25	-4.10	-4.75
631	3135.78		73.32		-3.83	
632	3140.68	3141.71	73.43	73.63	-3.56	-4.34
633	3145.72		73.58		-3.37	
634	3150.66	3150.54	73.69	74.00	-3.18	-4.09
635	3155.78		73.78		-3.04	
636	3160.80	3160.48	73.73	74.13	-2.68	-3.52
637	3165.73		73.45		-2.57	
638	3170.76	3171.17	73.27	73.62	-2.39	-3.25
639	3175.72		73.15		-2.25	
640	3180.66	3180.43	73.01	73.36	-2.09	-2.80
641	3185.82		72.95		-1.93	
642	3190.69	3189.94	73.16	73.47	-1.94	-2.60

643	3195.76		73.12		-1.80	
644	3200.67	3200.97	72.58	72.88	-1.78	-2.46
645	3206.07		71.66		-1.03	
646	3210.72	3210.71	73.82	74.24	-1.20	-2.03
647	3215.65		75.20		-0.89	
648	3220.60	3220.46	77.29	77.60	-0.38	-1.20
649	3224.94		79.46		-0.02	
650	3229.39	3229.28	82.88	83.12	0.40	-0.49
651	3233.95		85.08		0.61	
652	3238.57	3238.51	86.60	86.65	1.13	0.23
653	3243.19		88.66		0.88	
654	3247.97	3247.57	89.67	89.70	0.86	-0.05
655	3252.53		91.47		1.02	
656	3257.00	3256.93	94.22	94.30	1.17	0.33
657	3261.41		96.83		1.10	
658	3265.87	3265.45	98.92	98.77	0.88	0.05
659	3270.40		101.06		0.98	
660	3274.93	3274.57	103.18	102.95	1.10	0.21
661	3279.55		105.15		1.19	
662	3284.02	3283.69	107.14	107.12	1.04	0.13
663	3288.60		108.92		1.06	
664	3293.19	3292.81	110.71	110.80	1.07	0.07
665	3297.91		112.38		0.90	
666	3302.60	3302.43	113.90	113.98	1.09	0.02
667	3307.39		115.29		1.14	
668	3312.26	3312.05	116.17	116.25	1.09	-0.04
669	3318.89		117.11		0.68	
670	3323.80	3323.77	117.61	117.83	0.79	-0.30
671	3328.87		117.88		0.23	
672	3333.56	3333.27	117.75	118.04	0.20	-0.46
673	3338.75		116.85		0.17	
674	3343.43	3343.38	115.79	116.14	0.44	-0.62
675	3348.46		114.74		0.28	
676	3353.44	3353.48	113.81	114.25	0.35	-0.78
677	3358.33		113.24		0.29	
678	3363.41	3363.20	112.79	113.11	1.27	0.38
679	3368.61		112.96		0.67	
680	3373.72	3373.22	112.94	113.31	0.70	-0.32
681	3378.70		112.91		0.90	
682	3383.43	3384.00	112.84	113.06	1.11	0.29
683	3388.39		112.59		1.65	
684	3393.37	3394.23	112.34	112.39	1.98	1.05
685	3398.28		111.52		2.06	
686	3403.03	3402.95	110.21	110.21	2.05	0.99
687	3407.77		108.73		2.06	
688	3412.85	3413.04	107.67	107.78	2.13	1.24
689	3417.82		107.13		1.92	
690	3422.75	3422.46	106.62	106.83	1.81	1.00
691	3427.86		105.98		2.24	
692	3432.77	3433.17	105.22	105.24	1.71	1.04
693	3437.78		104.27		2.38	
694	3442.60	3442.71	103.42	103.54	2.84	1.71
695	3447.47		102.53		2.80	
696	3452.39	3452.98	101.85	101.88	3.05	2.32

697	3457.23		101.03		3.29	
698	3462.29	3461.67	100.18	100.52	3.41	2.57
699	3467.31		99.08		3.72	
700	3472.55	3471.57	97.87	98.31	3.91	3.06
701	3477.08		96.70		4.02	
702	3482.04	3482.16	95.71	95.91	4.79	3.62
703	3487.13		95.88		4.88	
704	3492.12	3492.25	97.72	97.79	5.32	4.22
705	3496.87		99.84		5.34	
706	3501.48	3501.58	101.39	101.55	5.55	4.76
707	3506.00		101.61		5.00	
708	3511.00	3511.65	101.61	101.53	5.00	4.23
709	3516.52		102.17		4.99	
710	3521.76	3521.71	101.49	101.50	4.59	3.69
711	3526.64		100.56		4.73	
712	3531.60	3531.56	99.72	99.72	5.15	4.24
713	3536.52		98.97		5.56	
714	3541.38	3541.38	98.37	98.39	5.93	4.99
715	3546.47		97.96		6.40	
716	3551.44	3551.36	97.67	97.65	6.89	5.85
717	3556.04		97.31		7.26	
718	3561.75	3562.31	97.34	97.41	7.60	6.64
719	3566.30		97.25		7.50	
720	3571.42	3572.06	96.86	96.90	7.58	6.68
721	3576.30		96.43		7.59	
722	3581.33	3581.76	95.80	95.80	7.74	6.84
723	3586.26		95.31		7.84	
724	3591.17	3591.60	94.77	94.77	7.89	6.99
725	3596.27		94.12		7.55	
726	3601.11	3601.54	93.46	93.46	7.31	6.41
727	3606.07		92.73		7.26	
728	3610.85	3611.28	91.62	91.62	6.93	6.03
729	3615.97		90.61		6.74	
730	3621.57	3621.09	89.87	89.97	7.12	5.95
731	3625.26		89.58		6.59	
732	3630.13	3630.39	89.44	89.32	7.00	5.62
733	3635.04		88.68		6.42	
734	3640.45	3640.78	87.74	87.79	5.96	4.16
735	3644.91		86.78		6.20	
736	3649.79	3650.00	86.01	86.11	6.05	5.00
737	3655.01		84.75		6.18	
738	3659.91	3660.34	83.35	83.35	6.51	5.61
739	3664.31		82.11		6.15	
740	3669.18	3669.61	80.59	80.59	6.42	5.52
741	3674.05		78.84		6.23	
742	3678.33	3678.76	77.20	77.20	6.24	5.34
743	3683.25		75.32		6.32	
744	3688.29	3688.72	73.72	73.72	6.53	5.63
745	3693.15		72.37		6.50	
746	3697.95	3698.38	71.21	71.21	6.83	5.93
747	3702.75		70.19		6.65	
748	3707.65	3708.08	69.19	69.19	6.66	5.76
749	3712.71		68.22		6.97	
750	3717.74		67.04		7.12	

751	3722.37		65.77		6.92	
752	3727.18	3727.75	64.04	64.19	7.14	6.00
753	3732.00		65.61		7.00	
754	3737.51	3738.14	65.82	65.62	7.22	6.05
755	3742.37		67.03		7.16	
756	3747.45	3747.88	67.87	67.87	7.09	6.19
757	3752.17		68.20		7.52	
758	3757.25	3757.99	67.55	67.59	7.44	6.35
759	3761.13		67.06		7.66	
760	3767.24	3767.80	65.89	65.91	7.63	6.60
761	3772.22		65.07		7.87	
762	3777.14	3777.71	64.27	64.22	7.88	6.74
763	3782.00		63.50		7.65	
764	3787.09	3787.57	63.27	63.11	8.04	6.85
765	3792.38		63.33		8.23	
766	3797.34		63.57		8.37	
767	3801.96		64.08		8.22	
768	3806.72	3807.50	64.65	64.69	8.31	7.28
769	3811.80		65.00		8.38	
770	3816.89	3817.53	65.39	65.35	8.64	7.49
771	3821.99		65.36		8.85	
772	3826.97	3827.70	65.08	65.02	9.12	7.53
773	3831.43		64.29		9.46	
774	3836.79	3837.43	63.60	63.61	9.08	8.10
775	3841.85		62.83		9.33	
776	3846.31	3847.27	61.99	61.99	9.93	8.27
777	3851.55		60.91		9.75	
778	3856.51	3857.00	59.99	59.96	9.60	8.26
779	3861.42		58.70		9.80	
780	3866.22	3866.87	57.52	57.58	9.63	8.55
781	3870.87		56.40		10.01	
782	3875.69	3876.35	55.17	55.26	10.12	9.15
783	3880.75		54.01		10.19	
784	3884.76	3886.18	52.87	52.75	10.27	9.26
785	3890.11		51.41		10.08	
786	3895.14		50.22		10.48	
787	3899.97		49.05		10.79	
788	3904.96	3905.62	48.46	48.35	10.80	9.37
789	3910.06		47.57		10.93	
790	3915.01		47.52		11.06	
791	3919.93		47.18		11.10	
792	3924.93	3925.47	46.87	46.74	11.31	9.86
793	3929.83		46.62		11.42	
794	3934.52	3935.55	46.03	46.03	11.31	10.31
795	3939.62		45.23		11.67	
796	3944.72	3945.26	44.44	44.60	12.04	11.21
797	3949.82		43.64		12.40	
798	3954.45	3955.07	42.95	42.95	12.71	11.73
799	3959.43		42.12		12.74	
800	3964.14	3964.79	41.46	41.57	13.05	12.20
801	3969.72		40.49		13.49	
802	3974.24	3974.96	39.41	39.43	13.52	12.47
803	3978.73		38.51		13.78	
804	3983.61	3984.24	37.23	37.30	13.70	12.80

805	3988.73		35.57		14.03	
806	3993.05	3993.83	34.37	34.16	13.76	12.30
807	3998.49		32.65		13.00	
808	4002.84	4003.67	31.56	31.48	14.14	13.36
809	4007.95		30.19		14.42	
810	4012.54	4013.24	28.72	28.77	14.63	13.63
811	4017.42		26.77		14.58	
812	4022.12	4022.34	24.96	25.33	14.72	13.77
813	4026.57		23.27		14.50	
814	4031.77	4032.47	21.52	21.51	14.80	13.80
815	4036.33		19.85		14.85	
816	4040.78	4041.39	18.19	18.35	14.93	13.95
817	4045.50		16.00		14.30	
818	4050.65	4050.99	18.65	18.51	14.39	13.01
819	4056.09		20.67		13.92	
820	4060.13	4060.89	22.40	22.46	13.78	12.73
821	4064.81		23.71		14.03	
822	4069.66	4070.66	23.51	23.49	13.58	12.35
823	4075.03		23.71		13.97	
824	4079.44	4079.81	20.81	20.51	13.10	11.97
825	4084.03		19.47		13.03	
826	4088.74	4089.50	18.74	18.76	12.84	11.90
827	4093.98		18.13		12.64	
828	4099.08	4099.75	17.89	17.92	12.47	11.53
829	4103.89		18.15		12.24	
830	4108.51	4109.40	18.21	18.14	12.09	10.43
831	4113.74		18.30		11.29	
832	4118.81	4119.51	18.49	18.58	11.02	9.92
833	4123.57		18.67		10.85	
834	4128.75		18.68		10.98	
835	4134.36		18.93		10.85	
836	4138.77	4139.52	19.31	19.49	10.57	9.48
837	4143.74		19.54		11.13	
838	4148.79	4149.46	19.68	19.81	11.21	10.09
839	4153.78		19.76		11.29	
840	4158.85	4159.42	19.16	19.33	11.32	10.36
841	4163.73		20.08		11.24	
842	4168.85	4169.28	21.20	21.47	11.53	10.58
843	4173.54		21.53		11.48	
844	4178.27	4179.17	22.08	22.67	11.96	10.73
845	4183.93		23.78		11.58	
846	4189.07	4189.50	25.12	25.35	11.65	10.71
847	4193.68		26.02		11.61	
848	4198.46	4199.09	26.77	27.18	11.32	10.32
849	4203.45		27.57		11.46	
850	4208.18	4209.03	27.71	28.05	11.49	10.60
851	4213.25		27.83		10.73	
852	4218.35	4219.19	27.24	27.83	10.28	9.19
853	4223.00		26.88		10.38	
854	4228.17	4228.85	27.22	26.84	10.25	8.70
855	4232.92		28.75		10.60	
856	4237.76	4238.44	30.27	30.10	10.63	9.95
857	4242.57		31.22		10.89	
858	4247.78	4248.52	32.61	32.33	11.59	10.50

859	4252.50		33.71		11.88	
860	4257.14	4257.92	35.02	34.93	11.97	10.79
861	4262.30		36.54		12.04	
862	4267.10	4267.81	37.63	37.64	11.84	10.47
863	4272.15		38.73		11.75	
864	4276.83	4277.60	39.20	39.30	11.68	10.69
865	4281.84		39.70		11.74	
866	4286.70	4287.08	40.26	40.43	12.06	10.76
867	4291.69		40.77		12.36	
868	4296.67	4297.04	41.29	41.50	12.65	11.63
869	4301.64		41.66		12.86	
870	4306.61	4307.08	42.02	42.27	13.06	12.07
871	4311.53		42.29		13.38	
872	4316.45	4317.29	42.57	42.78	13.69	12.72
873	4321.60		42.74		14.03	
874	4326.76	4327.37	42.91	43.20	14.38	13.08
875	4331.67		42.93		14.66	
876	4336.58	4337.40	42.94	43.21	14.93	13.65
877	4341.59		42.92		15.17	
878	4346.60	4347.35	42.89	43.20	15.41	14.26
879	4351.60		42.12		15.76	
880	4356.60	4357.42	41.36	42.55	16.10	14.87
881	4361.55		40.68		16.22	
882	4366.49	4367.32	40.00	40.66	16.33	15.10
883	4371.64		39.60		16.63	
884	4376.79	4377.27	39.21	39.71	16.93	15.82
885	4381.59		38.57		17.07	
886	4386.40	4386.96	37.93	38.52	17.21	15.81
887	4391.29		37.62		17.38	
888	4396.19	4396.76	37.32	37.63	17.55	16.28
889	4401.08		36.81		17.76	
890	4405.98	4406.60	36.30	36.64	17.98	16.71
891	4410.99		35.77		18.11	
892	4416.00	4416.66	35.25	35.60	18.24	17.03
893	4420.91		34.45		18.31	
894	4425.81	4426.57	33.64	33.92	18.39	17.00
895	4430.94		33.19		18.65	
896	4436.06	4436.94	32.73	33.01	18.91	17.66
897	4440.93		32.85		18.89	
898	4445.79	4446.70	32.97	33.30	18.88	17.81
899	4450.95		33.03		19.09	
900	4456.11	4456.70	33.09	33.50	19.31	18.20
901	4461.16		32.71		19.65	
902	4466.20	4466.92	32.34	32.61	19.99	18.71
903	4471.11		33.11		20.22	
904	4476.02	4476.77	33.88	34.04	20.45	19.42
905	4481.07		34.14		20.71	
906	4486.12	4486.85	34.39	34.62	20.97	19.69
907	4490.98		34.85		21.20	
908	4495.83	4496.80	35.31	35.48	21.43	20.28
909	4500.84		35.79		21.60	
910	4505.85	4506.55	36.27	36.40	21.76	20.86
911	4510.77		36.85		21.99	
912	4515.68	4516.09	37.44	37.34	22.23	20.85

913	4520.73		38.34		22.43	
914	4525.78	4526.17	39.24	39.07	22.64	21.36
915	4530.77		39.16		22.84	
916	4535.76	4536.57	39.08	38.77	23.05	21.60
917	4540.80		37.43		23.20	
918	4545.84	4546.28	35.79	35.95	23.35	22.50
919	4550.92		36.24		23.87	
920	4555.99	4556.51	36.69	36.93	24.39	23.15
921	4560.92		37.45		24.65	
922	4565.85	4566.61	38.20	38.56	24.92	23.90
923	4570.54		39.32		25.27	
924	4575.22	4576.09	40.44	40.85	25.62	24.54
925	4580.24		41.17		25.74	
926	4585.26	4585.82	41.90	42.34	25.86	24.86
927	4590.30		42.21		25.98	
928	4595.34	4595.78	42.53	42.96	26.10	24.97
929	4600.33		42.63		26.14	
930	4605.32	4605.95	42.73	43.10	26.17	25.06
931	4610.37		42.88		26.19	
932	4615.42	4615.86	43.04	43.49	26.22	25.08
933	4620.35		43.31		26.17	
934	4625.28	4625.69	43.58	43.83	26.12	25.00
935	4630.24		44.86		26.15	
936	4635.21	4635.80	46.14	46.57	26.17	24.98
937	4640.15		47.70		26.12	
938	4645.08	4645.99	49.27	49.77	26.08	24.87
939	4649.81		50.62		26.35	
940	4654.54	4655.04	51.98	52.51	26.61	25.41
941	4659.28		53.52		26.66	
942	4664.03	4664.72	55.07	55.53	26.70	25.66
943	4668.82		56.30		26.79	
944	4673.62	4674.43	57.53	58.04	26.88	25.61
945	4678.61		58.47		27.14	
946	4683.61	4684.15	59.42	59.75	27.41	26.26
947	4688.54		59.76		27.48	
948	4693.47	4693.18	60.10	60.61	27.54	26.57
949	4698.45		60.22		27.62	
950	4703.43	4704.06	60.33	61.03	27.71	26.70
951	4708.18		59.96		27.64	
952	4712.92	4713.16	59.59	60.28	27.58	26.84
953	4718.17		59.29		27.52	
954	4723.41	4724.10	58.99	59.59	27.46	26.18
955	4728.36		59.35		27.53	
956	4733.31	4733.96	59.71	60.43	27.60	26.49
957	4738.38		59.86		27.76	
958	4743.44	4744.10	60.02	60.64	27.92	26.78
959	4748.54		60.89		28.16	
960	4753.64	4753.73	61.77	62.45	28.40	27.31
961	4758.46		62.62		28.36	
962	4763.27	4764.28	63.47	64.20	28.33	27.16
963	4768.53		65.19		28.03	
964	4773.80	4774.59	66.91	67.39	27.73	26.68
965	4778.20		67.94		28.48	
966	4782.61	4783.24	68.97	69.46	29.23	28.20

967	4787.52		69.78		29.38	
968	4792.43	4792.71	70.58	71.16	29.52	28.22
969	4797.44		70.37		29.60	
970	4802.44	4802.69	70.15	70.79	29.67	28.39
971	4807.44		70.23		29.73	
972	4812.43	4812.65	70.31	70.89	29.80	28.52
973	4817.45		70.40		29.47	
974	4822.47	4823.20	70.49	71.34	29.15	28.03
975	4827.63		70.70		29.44	
976	4832.79	4833.27	70.91	71.44	29.74	28.73
977	4837.84		70.75		29.92	
978	4842.90	4843.25	70.59	71.09	30.10	28.96
979	4847.77		70.51		29.98	
980	4852.64		70.42		29.85	
981	4857.58		70.11		29.86	
982	4862.53		69.80		29.88	
983	4867.49		68.72		29.85	
984	4872.45		67.64		29.82	
985	4878.10		65.83		29.44	
986	4883.75		64.01		29.07	
987	4888.75		62.01		29.07	
988	4893.75		60.01		29.07	