Supplementary materials for "A new GPS velocity field for the Pacific plate, Part 2: Implications for fault slip rates in western California"

by C. DeMets et al.

1 Summary

This supplementary document outlines the methods by which we estimated velocities for continuous and campaign sites, tabulates the GPS station velocities used in the study (Table 1) and offsets that were applied at some campaign sites to correct for the effects of the 2003 San Simeon and 2004 Parkfield earthquakes (Table 2), and shows viscoelastic velocity perturbations to the 1994-2014 velocity field of central California attributable to the 1857 Fort Tejon and 1906 San Francisco earthquakes.

2 Velocity estimation for continuous GPS stations

We determined long-term interseismic velocities of continuous GPS stations in central California from inversions of their daily station positions. For continuous sites affected by either the December 22, 2003 San Simeon earthquake or the September 28, 2004 Parkfield earthquake, we excluded data extending several years after the earthquake to minimize the influence on the estimated slope of transient postseismic deformation triggered by the earthquake. For sites affected by both earthquakes, we excluded all observations between the 2003 San Simeon earthquake and mid-2008 and estimated a single slope to best fit the observations before the San Simeon earthquake and after mid-2008 and a single, combined offset for the two earthquakes.

3 Velocity estimation for campaign GPS stations

Many campaign sites were also offset by one or both of the San Simeon and Parkfield earthquakes and their postseismic deformation. Estimates of the cumulative coseismic and postseismic effects of both earthquakes are available for 45 of the campaign sites used in this study based on modeling described by *Rolandone et al.* (2006) and *Johanson et al.* (2006). The corrections are listed in Table 2 and are displayed in Fig. 10 of the supplementary documentation from *Titus et al.* (2011). We applied these corrections to the relevant station position time series in order to minimize the effects of the two earthquakes on our velocity estimates for these 45 campaign sites.

4 Viscoelastic velocity perturbations

Figs. S1 and S2 display velocities attributable to viscoelastic deformation of central California between 1994 and 2014 from the 1857 Fort Tejon and 1906 San Francisco earthquakes. As described in the main document, the velocity perturbations are calculated in order to maximize the likely viscoelastic effects of both earthquakes. The velocity perturbations will thus significantly overestimate the viscoelastic component of the present velocity field if the viscosities assumed for the crust and mantle are too low. Details regarding the assumed viscosity structure are given in the main document and reproduce the M1 viscosity structure described by *Hearn et al.* (2013).

References

Johanson, I. A., Fielding, E. J., Rolandone, F., and Burgmann, R., 2006, Coseismic and postseismic slip of the 2004 Parkfield earthquake from space-geodetic data, Bulletin of the Seismological Society of America, v. 96, S269–S282, doi:10.1785/0120050818.

Hearn, E. H., C. T. Onishi, F. F. Pollitz, and W. R. Thatcher, 2013, How do "ghost transients" from past earthquakes affect GPS slip rate estimates on southern California faults?, *Geochem. Geophys. Geosys.*, *14*, doi: 10.1002/ggge.20080.

Rolandone, F., Dreger, D., Murray, M., and Burgmann, R., 2006, Coseismic slip distribution of the 2003 M_w 6.6 San Simeon earthquake, California, determined from GPS measurements and seismic waveform data, Geophysical Research Letters, v. 33, L16315, doi: 10.1029/2006GL027079.

Thatcher, W., G. Marshall, and M. Lisowski, 1997. Resolution of fault slip along the 470-km-long rupture of the great 1906 San Francisco earthquake and its implications, *J. Geophys. Res.*, *102*, 5353–5367.

Titus, S. J., Dyson, M., DeMets, C., Tikoff, B., Rolandone, F., & Burgmann, R., 2011. Geologic versus geodetic deformation adjacent to the San Andreas fault, central California, *Geol. Soc. Am. Bull.*, **doi:10.1130/B30150.1**.

Zielke, O., J. R. Arrowsmith, L. G. Ludwig, and S. O. Akciz, Slip in the 1857 and earlier large earthquakes along the Carrizo Plain, San Andreas Fault, 2010. *Science, 327*, 1119–1122, doi: 10.1126/science.1182781.

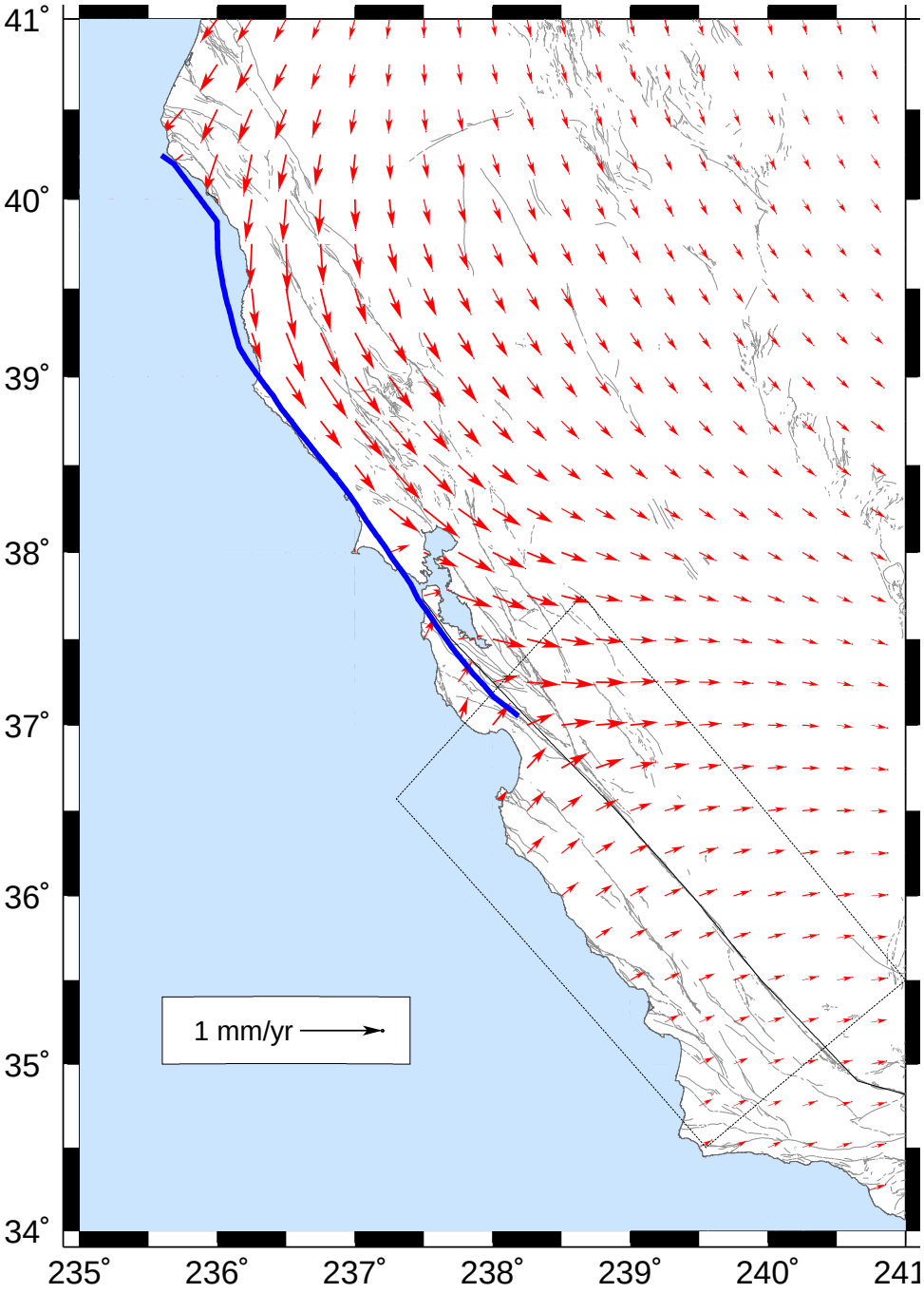

Figure 1: Viscoelastic deformation (red arrows) calculated for the April 18, 1906 San Francisco earthquake. Blue line shows the extent of the *Thatcher et al.* (1997) fault slip solution that is used to drive the viscoelastic model. Rheological model M1 from *Hearn et al.* (2013) is used to maximize the viscoelastic response to the earthquake. The gray box outlines the region in central California that is pertinent to this study. In order to facilitate the comparison to GPS velocities, the viscoelastic deformation was computed for the period 1994 to 2014, coinciding with the period of GPS observations used in this study, and converted to 20-yr-average velocities.

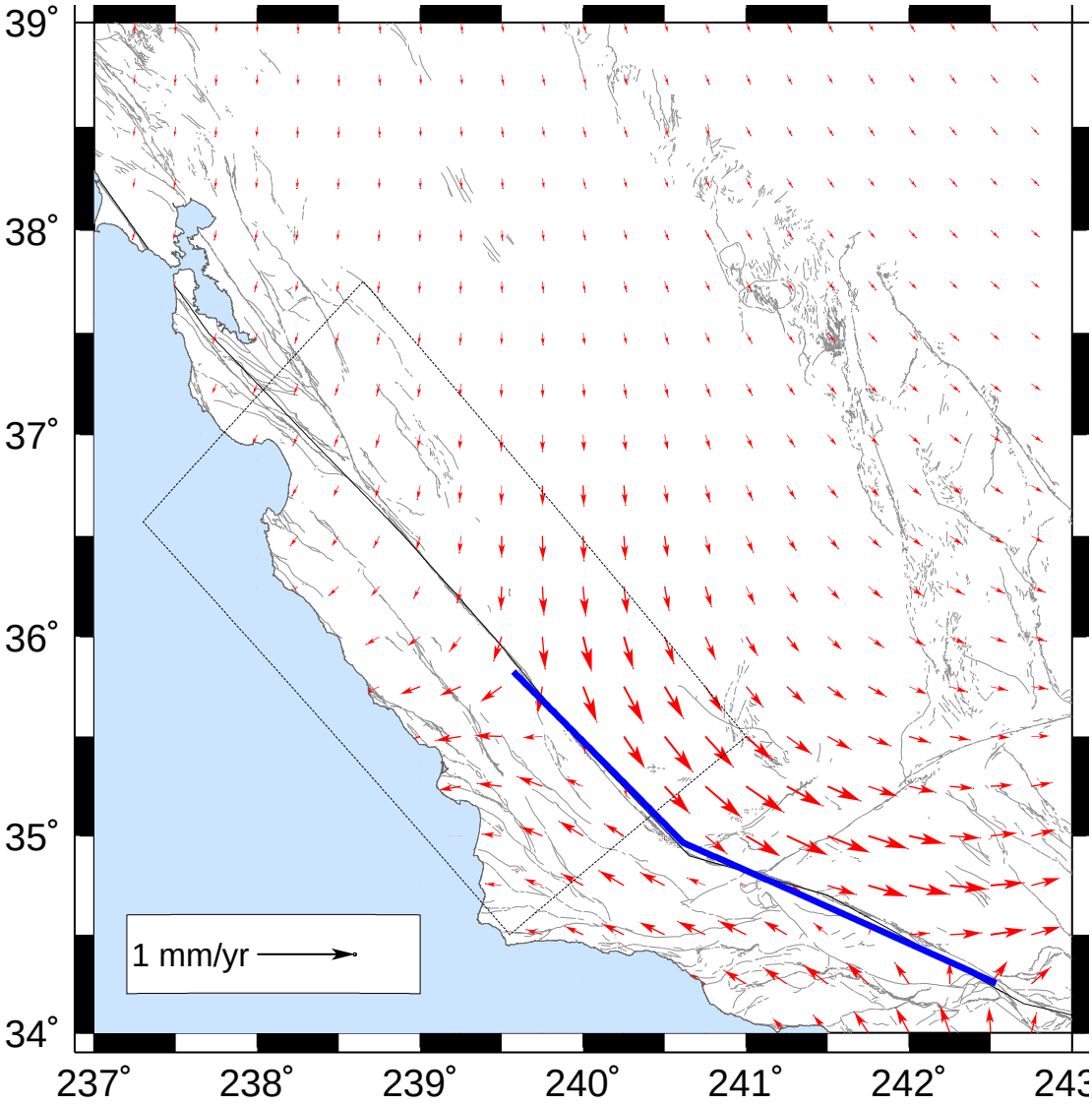

Figure 2: Viscoelastic deformation (red arrows) calculated for the January 9, 1857 Fort Tejon earthquake. Blue line shows the extent of the *Ziekle et al.* (2010) fault slip solution that is used to drive the viscoelastic model. Rheological model M1 from *Hearn et al.* (2013) is used to maximize the viscoelastic response to the earthquake. The gray box outlines the region in central California that is pertinent to this study. In order to facilitate the comparison to GPS velocities, the viscoelastic deformation is computed for the period 1994 to 2014, coinciding with the period of GPS observations used in this study, and converted to 20-yr-average velocities.

Table 1: GPS station information

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
0508	35.855	120.799	-41.0±2.3	20.5±1.2	0.0000	19	13.9	1993.64
0510	36.188	120.816	-39.8±0.7	21.5±0.4	0.0000	21	9.0	1998.51
05QJ	35.949	120.878	-41.3±0.7	21.8±0.6	0.0000	21	4.5	2003.04
05RH	36.049	120.965	-40.5±0.8	22.3±0.9	0.0000	12	2.8	2004.75
05SH	36.153	120.973	-40.8±2.2	23.7±1.2	0.0000	13	4.5	2003.05
05SK	36.178	120.691	-19.1±2.4	0.7±1.3	0.0000	20	4.5	2003.04
05UH	36.410	120.996	-25.9±2.0	0.6±1.1	0.0000	12	4.9	2002.63
05WF	36.696	121.270	-30.8±3.9	8.9±2.4	0.0000	3	2.7	2004.87
05YF	36.793	121.325	-24.3±4.0	1.0±2.1	0.0000	3	2.7	2004.87
1315	35.795	121.345	-41.1±0.9	24.2±0.6	0.0000	8	13.3	1998.51
2068	35.529	121.043	-39.8±0.6	28.5±0.7	0.0000	15	5.3	2003.98
2069	35.565	120.706	-37.4±0.7	22.9±0.8	0.0000	16	3.9	2005.34
2076	35.605	121.134	-39.5±1.7	26.1±1.1	0.0000	10	5.3	2003.98
AKRS	36.304	120.706	-21.3±2.4	-0.7±1.3	0.0000	12	4.1	2003.40
ALMO	35.552	120.453	-36.4±0.9	21.2±0.7	0.0000	23	15.0	1993.35
ALTH	36.890	120.670	-20.4±0.8	-1.5±0.6	0.4311	930	3.3	2010.74
ALVS	36.363	121.226	-39.6±2.2	21.9±1.2	0.0000	14	4.5	2003.03
ANA1	34.015	119.363	-40.5±0.4	22.3±0.6	-0.1180	4224	12.2	2002.36
ANET	35.651	120.170	-30.1±4.4	7.4±2.4	0.0000	7	2.1	2007.20
AQDT	36.326	120.227	-23.0±2.5	-5.5±1.9	0.0000	13	4.0	2003.43
AVIL	35.171	120.756	-39.7±1.0	25.2±0.6	0.0000	8	12.7	1998.51
BAR1	33.480	119.030	-41.7±0.4	23.2±0.4	0.0243	4228	12.2	2002.33
BARR	35.456	120.573	-39.2±0.9	21.7±0.5	0.0000	17	12.0	1996.35
BENC	35.746	120.351	-32.2±0.3	14.9±0.3	0.0000	18	15.0	1993.35
BHRM	35.359	120.832	-38.2±0.9	23.6±0.5	0.0000	9	17.9	1993.88
BIDD	35.161	120.475	-39.6±2.2	22.6±1.1	0.0000	7	5.0	2006.84
BITT	36.417	120.982	-23.1±0.7	1.0±1.4	0.0000	16	4.1	2003.38
BKR2	35.133	119.109	-25.9±0.6	3.5±1.0	-0.2685	2916	9.9	2004.14
BR82	34.934	120.569	-39.9±4.2	23.2±3.1	0.0000	5	2.4	2008.81
BREK	35.888	120.462	-36.2±0.9	19.1±0.6	0.0000	17	15.9	1993.36
BRU2	36.590	121.773	-39.9±0.4	24.1±0.4	0.0000	48	12.9	1993.28
BUCK	35.925	120.537	-33.3±1.0	20.4±0.5	0.0000	8	15.9	1993.36
BVPP	35.157	119.348	-28.8±0.3	3.7±0.3	0.3447	4557	13.2	2000.84
CAAA	37.186	121.783	-32.2±1.3	11.5±0.8	0.0000	12	12.1	1993.09
CAND	35.939	120.434	-24.0±0.3	6.3±0.4	-0.8807	3922	14.4	1999.64
CANX	36.413	120.782	-21.0±1.2	0.7±0.7	0.0000	15	8.6	1998.88
CARR	35.888	120.431	-34.2±0.5	17.3±0.4	-0.0702	2637	8.3	1995.00
CARX	35.888	120.431	-34.2±1.6	17.2±0.8	0.0000	19	7.9	1995.29
CASM	34.794	120.508	-41.3±1.4	23.2±0.8	0.0000	14	2.5	2007.79
CBAR	35.756	120.265	-28.5±0.7	10.3±0.4	0.0000	10	15.0	1993.35
CHEC	35.970	120.584	-36.3±1.3	18.7±0.9	0.0000	7	16.0	1993.36
CHLN	36.448	121.195	-38.9±1.3	23.8±0.7	0.0000	6	8.7	1998.88
CHOR	35.333	120.735	-39.7±0.7	22.6±0.7	0.3036	876	3.8	2008.77

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
CHOW	37.085	120.211	-22.2±0.9	2.5±1.1	0.5211	882	3.3	2010.79
CORX	32.415	117.248	-30.1±1.6	13.7±1.2	0.0000	1373	4.6	2000.88
CR88	35.242	119.725	-30.4±2.9	10.1±1.7	0.0000	6	3.5	2006.79
CRBT	35.792	120.751	-38.3±0.3	21.4±0.3	-0.9808	3454	12.8	2001.70
CROS	36.823	121.518	-41.2±1.2	24.0±0.7	0.0000	21	9.8	1994.41
CRU1	34.029	119.785	-41.6±0.3	23.5±0.3	0.1599	5035	14.0	2000.49
CRVO	36.445	120.481	-20.3±2.0	0.8±1.1	0.0000	4	5.7	1998.88
CTWD	35.788	120.222	-24.8±0.8	6.6±0.4	0.0000	18	15.9	1993.35
CV10	36.774	121.795	-40.0±3.5	24.6±1.8	0.0000	4	3.0	2003.19
CVM1	36.473	120.580	-20.9±1.9	0.3±1.0	0.0000	5	5.7	1998.88
D933	37.260	120.994	-23.1±2.8	-4.2±1.8	0.0000	3	4.2	2003.88
DAPK	35.254	120.772	-40.0±0.6	24.2±0.6	0.0425	617	4.0	2008.43
DCAN	35.212	120.845	-40.5±0.6	24.9±0.6	0.3175	762	4.1	2008.35
DGA3	36.861	121.564	-39.0±0.8	20.1±0.4	0.0000	17	17.8	1994.41
DMAV	34.726	120.542	-42.4±3.9	23.7±2.0	0.0000	5	2.6	2007.80
DTOG	36.113	120.585	-19.0±2.3	-5.4±1.5	0.0000	14	4.1	2003.40
DUCK	36.182	75.751	-13.4±0.4	4.3±0.5	0.7467	1257	6.6	1997.66
EADE	36.081	120.920	-41.8±2.4	21.4±1.4	0.0000	13	4.1	2003.40
FV30	36.926	121.357	-24.0±0.9	-1.7±0.5	0.0000	20	11.8	1994.42
GDEC	35.189	119.864	-34.9±0.3	14.2±0.3	0.0343	4372	14.1	2000.42
GMPK	33.051	114.827	-12.0±0.7	-9.3±0.9	-0.8300	3068	14.3	2000.20
GO42	35.831	120.350	-26.5±0.8	9.5±0.5	0.0000	12	15.0	1993.36
GO57	35.557	120.107	-30.8±5.0	8.4±3.2	0.0000	4	2.2	2007.08
GR8V	36.399	120.416	-21.2±0.4	-1.3±0.4	0.7076	4007	11.0	2003.06
GREG	36.982	121.924	-38.5±0.8	21.2±0.5	0.0000	15	19.0	1993.09
GRIG	36.029	120.864	-41.7±2.4	21.9±1.3	0.0000	15	4.0	2003.41
GRIS	36.503	120.729	-20.7±2.0	0.8±1.1	0.0000	4	5.7	1998.88
GRN1	35.401	120.491	-38.3±3.8	20.8±2.0	0.0000	10	2.4	2007.79
GRSW	36.503	120.729	-19.7±1.1	2.0±1.6	0.0000	13	1.5	2003.41
H104	37.464	121.178	-23.6±1.2	-3.7±0.6	0.0000	8	12.2	1993.09
HARV	34.469	120.682	-42.6±0.3	24.6±0.3	0.2692	6361	20.9	1993.00
HEPS	36.315	120.825	-20.5±2.0	1.1±1.1	0.0000	4	5.7	1998.88
HIMT	35.271	120.462	-38.7±0.7	22.0±0.8	0.5765	552	3.0	2009.73
HNDZ	36.363	120.786	-20.8±2.4	-0.1±1.4	0.0000	11	4.1	2003.40
HOGS	35.867	120.479	-35.1±0.3	18.8±0.3	-0.9889	2443	13.0	2001.53
HOME	36.293	120.989	-40.3±2.3	22.6±1.3	0.0000	14	4.1	2003.38
HTH2	35.182	120.236	-38.5±2.7	18.5±1.6	0.0000	12	3.6	2006.83
HTR1	35.686	120.178	-29.1±0.7	10.0±0.4	0.0000	10	15.9	1993.35
HUNT	35.881	120.402	-26.1±0.3	7.6±0.3	-0.9807	2950	12.5	2001.60
HUSP	35.644	120.231	-33.5±4.5	13.1±2.3	0.0000	6	2.1	2007.22
JD84	35.957	120.540	-37.2±1.0	19.9±0.7	0.0000	13	15.0	1993.36
KNGR	35.914	120.347	-24.9±0.8	7.3±0.5	0.0000	13	16.0	1993.36
LAMO	34.799	120.257	-41.6±2.5	22.1±1.5	0.0000	12	17.6	1994.18
LAND	35.900	120.473	-34.8±0.3	18.5±0.3	-0.9384	3742	14.9	1999.65
LEMA	36.292	119.782	-19.6±0.5	-1.9±0.5	0.4221	825	7.8	2005.82

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
LEY_	36.453	120.894	-21.2±1.3	0.3±0.8	0.0000	8	8.7	1998.88
LGO7	35.036	119.760	-37.0±1.2	14.3±0.7	0.0000	13	13.0	1993.78
LIVI	37.387	120.721	-22.6±2.7	-2.6±1.6	0.0000	3	4.2	2003.88
LNCO	36.360	119.058	-22.0±0.3	-1.0±0.3	0.1567	3483	9.8	1999.72
LNDA	34.960	120.300	-40.2±2.9	23.6±1.6	0.0000	12	12.9	1994.18
LOWS	35.829	120.594	-36.9±0.3	19.8±0.8	-0.4495	1281	12.9	2001.59
LP1X	37.110	121.845	-32.8±0.8	15.6±0.5	0.0000	48	17.6	1993.08
LP2X	37.104	121.909	-34.3±1.4	18.0±0.9	0.0000	13	12.0	1993.21
LP4X	37.050	121.839	-34.3±1.3	18.8±0.8	0.0000	13	12.2	1993.09
M113	37.108	121.037	-23.4±2.3	-2.8±1.2	0.0000	3	4.9	2003.19
MA80	35.076	120.067	-38.8±1.4	19.3±0.8	0.0000	14	17.0	1994.18
MADS	36.163	120.870	-41.1±2.3	22.6±1.2	0.0000	11	4.4	2003.05
MASO	35.833	120.443	-32.5±1.6	17.4±0.9	0.0000	11	9.9	1993.35
MASW	35.833	120.443	-34.4±0.3	17.9±0.7	-0.6739	2789	12.9	2001.60
MAZZ	37.137	121.788	-33.8±1.4	13.4±0.8	0.0000	11	12.1	1993.09
MEE1	36.187	120.759	-22.5±0.4	-0.1±0.4	0.5466	3097	11.0	2003.06
MEE2	36.181	120.767	-40.1±0.3	21.4±0.3	-0.2586	3119	11.5	2003.06
MEE3	36.186	120.806	-40.4±2.2	21.1±1.2	0.0000	10	4.4	2003.05
MEE4	36.180	120.771	-41.6±3.0	19.9±1.6	0.0000	8	3.2	2004.24
MIDA	35.922	120.459	-25.6±0.3	8.3±0.4	-0.9352	2918	14.4	1999.65
MIG1	34.038	120.351	-42.2±0.3	25.3±0.3	0.1899	4904	14.1	2000.46
MILX	35.606	120.089	-27.4±4.2	12.8±2.3	0.0000	12	2.1	2007.20
MLFL	35.260	119.954	-35.3±3.2	15.9±1.7	0.0000	4	3.2	2007.22
MNMC	35.970	120.434	-22.1±0.4	5.0±0.3	-0.9145	3302	12.5	2001.59
MONT	35.949	120.708	-35.9±0.4	21.1±0.3	0.0000	26	15.0	1993.36
MORS	36.841	121.494	-29.2±1.2	12.9±0.8	0.0000	11	11.8	1994.41
MULL	36.749	121.799	-41.8±3.4	24.7±2.1	0.0000	9	5.9	1994.41
MUSB	37.170	119.309	-22.2±0.3	-2.0±0.3	-0.0830	5311	16.2	1997.85
MUST	35.388	120.032	-33.8±4.4	13.9±2.4	0.0000	6	2.2	2007.22
NAPO	35.503	119.959	-28.9±1.8	9.8±0.9	0.0000	8	6.5	2003.81
NDDD	37.069	121.809	-33.4±1.4	15.9±0.8	0.0000	15	12.2	1993.09
NINO	36.246	121.035	-39.6±2.2	22.4±1.2	0.0000	13	4.4	2003.06
NIPO	35.091	120.538	-40.7±0.5	22.8±0.5	0.0752	793	4.3	2008.39
NOHW	35.444	120.044	-34.0±4.2	13.3±2.2	0.0000	11	2.2	2007.20
NWID	36.419	120.673	-21.7±2.5	0.5±1.5	0.0000	10	4.1	2003.41
ONIE	37.080	121.060	-23.3±0.8	-2.8±0.5	0.0000	16	13.7	1994.42
OQUI	35.885	120.442	-32.4±1.1	17.4±0.7	0.0000	11	14.5	1993.88
ORCU	34.850	120.481	-41.2±0.7	25.2±0.6	0.3103	657	4.1	2008.62
ORES	34.739	120.279	-40.9±0.3	23.0±0.3	-0.5452	5301	14.7	1999.78
P056	36.027	119.063	-23.4±0.4	-0.1±0.6	0.3841	2949	8.2	2005.88
P067	35.552	121.003	-39.3±0.3	25.9±0.3	0.8567	2374	10.3	2004.20
P171	36.486	121.793	-40.4±0.4	23.7±0.4	0.2956	3586	9.9	2004.67
P172	36.228	121.767	-40.6±0.4	24.0±0.4	0.1494	2249	6.2	2008.31
P173	35.946	121.290	-40.0±0.4	23.7±0.4	0.2323	2161	5.9	2008.58
P174	36.302	121.051	-39.9±0.4	22.6±0.4	0.0195	2660	7.4	2007.07

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
P175	36.426	121.135	-39.8±0.4	22.6±0.4	-0.1092	2948	8.1	2006.38
P180	36.293	121.403	-39.3±0.4	23.3±0.4	0.1163	2714	7.5	2007.06
P210	36.816	121.732	-39.6±0.4	21.2±0.4	0.2684	3321	9.1	2005.40
P211	36.879	121.698	-38.6±0.4	20.4±0.4	0.1572	2603	7.3	2007.22
P212	36.962	121.863	-38.1±0.4	20.8±0.4	0.1354	2988	8.2	2006.31
P213	37.202	121.991	-33.7±0.4	16.3±0.3	0.1410	3301	9.1	2005.40
P214	37.001	121.797	-36.5±0.4	18.5±0.4	0.1208	2388	6.8	2007.72
P215	37.049	121.763	-34.1±0.4	15.0±0.4	0.1474	2647	7.3	2007.26
P216	37.002	121.726	-34.8±0.4	16.1±0.4	0.2672	2653	7.3	2007.22
P217	37.105	121.651	-31.9±0.4	11.2±0.4	-0.0869	3378	9.3	2005.24
P218	37.204	121.714	-32.2±0.4	11.8±0.4	0.3745	3204	9.1	2005.46
P231	36.622	121.905	-40.4±0.4	23.1±0.5	-0.1591	2740	7.6	2006.92
P232	36.724	121.579	-39.7±0.4	22.6±0.4	0.1047	2657	7.3	2007.23
P233	36.800	121.420	-29.4±0.4	13.7±0.4	0.2521	2871	7.9	2006.64
P234	36.859	121.591	-38.7±0.4	20.3±0.4	0.0294	2905	8.0	2006.53
P235	36.814	121.542	-39.0±0.4	22.0±0.4	-0.0825	2571	7.1	2007.45
P236	36.904	121.554	-33.2±0.4	13.5±0.4	-0.1338	3004	8.7	2005.80
P237	36.637	121.387	-39.7±0.4	22.7±0.4	-0.1056	2666	7.4	2007.13
P238	36.849	121.453	-29.2±0.6	11.9±0.6	-0.2662	2969	8.3	2006.27
P239	36.963	121.548	-32.0±0.4	10.9±0.4	0.1969	2229	6.2	2008.31
P240	37.008	121.542	-31.5±0.4	11.1±0.4	0.4346	3146	9.1	2005.40
P241	37.213	121.574	-24.6±0.4	0.5±0.4	0.3344	2432	6.7	2007.38
P242	36.954	121.463	-30.7±0.4	10.9±0.6	-0.3827	3481	9.6	2004.96
P243	36.918	121.335	-24.2±0.4	-1.0±0.4	0.1303	2418	6.7	2007.38
P244	37.011	121.355	-24.6±0.4	-1.6±0.4	0.0429	2977	8.2	2005.88
P247	36.560	121.188	-39.5±0.4	22.7±0.4	0.1434	2955	8.1	2006.40
P249	36.612	121.064	-20.7±0.4	-0.9±0.5	0.3355	2929	8.6	2005.44
P250	36.950	121.268	-23.7±0.4	-1.4±0.4	0.1702	2437	6.7	2007.37
P251	36.811	121.348	-24.1±0.4	2.2±0.4	0.2527	2693	7.8	2006.27
P252	37.170	121.058	-22.8±0.4	-3.0±0.4	0.1522	2903	8.2	2005.86
P258	37.385	121.283	-22.7±0.5	-3.1±0.4	-0.1917	2467	6.8	2007.28
P259	37.433	121.101	-22.5±0.4	-3.0±0.4	-0.0390	3069	8.5	2005.57
P278	35.711	121.061	-39.5±0.4	22.6±0.8	0.6797	2381	10.4	2004.09
P279	35.791	121.062	-39.7±0.4	22.3±0.4	0.3341	2504	6.9	2007.64
P280	35.544	120.348	-36.2±0.4	18.8±0.4	0.0939	2922	8.0	2006.47
P281	35.841	120.389	-32.2±0.4	17.3±0.4	-0.8731	1129	9.7	2004.86
P282	35.838	120.345	-26.1±0.3	8.2±0.3	-0.9388	1931	9.2	2004.84
P283	35.807	120.285	-25.9±0.3	8.2±0.3	-0.7725	1934	9.2	2004.84
P284	35.933	120.907	-38.6±0.4	21.0±0.4	0.2388	2587	9.4	2005.11
P285	36.417	120.981	-23.0±0.4	2.1±0.4	0.1436	2742	7.5	2006.53
P286	36.516	120.853	-21.4±0.4	-0.6±0.4	0.1965	2333	6.4	2007.64
P287	36.025	120.698	-38.3±0.4	21.4±0.4	0.6749	1490	9.4	2005.10
P288	36.140	120.879	-39.6±0.4	22.0±0.4	0.0138	3048	8.4	2006.14
P289	36.107	120.749	-39.2±0.4	21.4±0.4	0.0783	2714	7.5	2007.07
P290	36.179	120.728	-21.4±0.4	0.0±0.4	0.0015	2876	7.9	2006.15

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
P291	35.923	120.645	-37.2±0.4	21.2±0.4	-0.3321	2505	6.9	2007.64
P292	36.008	120.475	-21.5±0.7	5.2±0.7	0.3642	2080	6.0	2008.11
P293	36.089	120.543	-21.6±0.5	2.8±0.4	0.0215	2655	7.3	2006.76
P294	36.123	120.440	-20.8±0.4	2.1±0.4	-0.0214	2738	7.7	2006.38
P295	35.697	120.842	-38.7±0.3	22.1±1.1	-0.0928	2723	10.5	2004.03
P296	36.052	120.364	-21.0±0.4	3.2±0.4	0.2330	2650	7.3	2006.77
P297	35.974	120.552	-36.6±0.5	20.8±0.5	-0.7470	1786	8.7	2005.80
P298	36.016	120.294	-21.4±0.4	3.2±0.4	0.4489	2930	8.6	2005.43
P299	36.257	120.710	-22.1±1.6	0.7±2.0	0.6994	2382	6.6	2007.43
P300	36.304	120.277	-20.0±0.8	0.8±0.5	0.8818	3250	9.1	2004.96
P301	36.806	120.743	-21.3±0.4	-2.1±0.3	-0.0404	3310	9.1	2004.96
P302	36.635	120.619	-20.0±0.5	-1.2±0.4	0.6175	3245	9.1	2004.96
P303	37.054	120.705	-22.2±0.4	-2.0±0.4	0.3832	2995	8.5	2005.57
P304	36.739	120.357	-23.7±0.4	-3.2±0.5	0.4610	3540	9.7	2004.33
P305	37.352	120.197	-22.4±0.4	-2.5±0.4	0.0168	3092	8.5	2005.56
P307	36.947	120.058	-24.8±0.4	-0.5±0.4	0.3060	3008	8.3	2005.80
P513	34.907	120.650	-41.5±0.4	23.7±0.4	0.1770	2657	7.3	2007.22
P514	35.011	120.410	-40.8±0.4	22.0±0.4	0.6546	2893	8.0	2006.57
P515	34.871	120.240	-41.4±0.4	20.8±0.4	0.1466	2968	8.2	2006.36
P516	35.106	120.383	-39.4±0.4	21.8±0.4	0.4806	3000	8.4	2006.10
P523	35.304	120.860	-40.4±0.5	23.8±0.8	0.6660	3021	8.4	2006.09
P524	35.166	120.591	-40.0±0.7	22.9±0.7	0.1188	738	2.0	2007.05
P525	35.426	120.808	-39.6±0.4	23.8±0.4	0.6219	2804	7.7	2006.82
P526	35.636	120.870	-39.2±0.4	21.4±0.4	0.8989	1637	10.4	2004.12
P527	35.754	120.605	-37.7±0.4	20.2±0.4	0.2419	2857	7.9	2006.66
P528	35.328	120.545	-38.7±0.4	21.9±0.4	0.3275	2834	7.8	2006.72
P529	35.440	120.354	-37.2±0.4	19.6±0.4	0.3207	2840	8.0	2006.47
P530	35.625	120.480	-36.8±0.4	20.6±0.5	0.6307	3244	9.0	2005.52
P531	35.793	120.537	-36.5±0.4	20.4±0.4	-0.1597	2717	7.5	2007.05
P532	35.634	120.267	-33.7±0.3	15.6±0.3	0.0126	3094	9.8	2004.77
P533	35.748	120.371	-34.0±0.4	17.4±0.4	0.1775	2925	8.2	2006.35
P535	35.235	120.101	-37.4±0.4	17.8±0.4	0.4852	2833	7.8	2006.72
P536	35.280	120.025	-35.9±0.4	16.1±0.4	0.2089	2972	8.2	2006.34
P537	35.317	119.935	-33.9±0.4	13.9±0.5	-0.5811	2949	8.2	2006.34
P538	35.534	120.112	-33.1±0.4	12.7±0.4	0.1538	2953	8.2	2006.34
P539	35.703	120.182	-27.7±0.3	8.8±0.3	-0.0957	2450	9.3	2004.75
P540	35.801	120.131	-24.1±0.4	5.0±0.4	0.2105	2567	8.0	2006.10
P541	35.687	120.001	-24.9±0.4	4.8±0.4	0.0240	2954	8.5	2005.51
P542	35.689	120.293	-33.3±0.4	15.7±0.4	0.1897	2319	6.4	2008.13
P543	35.319	119.713	-27.9±0.4	7.7±0.4	0.6520	2753	7.6	2006.47
P544	35.731	119.738	-22.3±0.4	0.9±0.4	-0.5224	2933	8.1	2005.95
P545	35.500	119.536	-24.4±0.6	1.7±0.4	0.4444	2265	6.2	2007.83
P546	35.928	120.155	-21.8±0.4	3.6±0.4	0.1525	2891	8.0	2006.09
P547	35.935	119.909	-21.5±0.4	2.4±0.4	0.2878	2946	8.1	2005.95
P552	35.687	120.245	-32.2±0.4	14.3±0.4	-0.0320	2322	6.4	2008.12

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
P563	35.419	119.421	-23.3±0.4	1.1±0.4	0.5107	2944	8.1	2005.96
P564	35.623	119.349	-23.2±0.6	3.4±0.7	-0.3428	2578	7.2	2006.84
P565	35.744	119.237	-23.9±0.7	-0.1±0.5	0.1825	2768	8.2	2005.88
P566	36.324	119.229	-23.2±0.4	-1.7±0.4	-0.0409	2976	8.2	2005.88
P576	35.670	120.970	-39.6±0.6	21.4±0.4	0.8242	2352	10.2	2004.31
P602	35.729	120.228	-27.3±0.4	9.2±0.4	0.2100	2153	5.9	2008.12
P629	37.376	119.179	-22.3±0.5	-2.5±0.4	0.2612	1934	5.5	2008.58
P725	37.089	119.746	-21.9±0.4	-1.6±0.4	0.1579	2506	7.3	2006.80
P788	36.744	121.479	-39.4±0.7	22.0±0.5	-0.1661	2011	5.9	2008.66
P796	32.498	114.759	-9.5±0.7	-8.3±0.5	-0.2042	1509	4.2	2010.36
PANC	36.698	120.739	-21.7±1.2	-0.8±0.7	0.0000	20	8.6	1998.88
PBHR	35.709	121.272	-40.6±0.6	24.9±0.6	0.4153	1113	3.7	2010.79
PDBL	35.665	121.283	-40.0±0.5	24.9±0.5	0.0170	510	4.2	2008.41
PFYF	36.202	120.736	-21.9±0.6	-0.8±0.8	0.0000	16	4.4	2003.06
PGN5	36.892	121.621	-38.5±3.6	20.3±1.9	0.0000	7	2.7	2004.85
PHEL	36.220	120.488	-21.7±2.3	-3.0±1.3	0.0000	15	4.1	2003.40
PKDB	35.945	120.542	-46.3±1.8	35.1±4.5	-0.5236	4280	17.8	1996.72
PNT2	35.448	120.951	-39.8±1.5	25.1±1.4	0.0000	9	7.1	2003.27
PNTD	35.154	119.808	-33.2±2.6	13.7±1.4	0.0000	3	4.4	2006.80
POMM	35.920	120.478	-35.6±0.4	16.6±0.3	-0.9559	3831	14.9	1999.64
POZO	35.346	120.299	-38.7±3.3	17.9±1.7	0.0000	10	17.0	1994.84
PT12	35.559	120.070	-31.6±4.9	11.6±2.6	0.0000	3	2.2	2007.23
QCYN	36.161	121.137	-39.7±0.3	22.7±0.3	0.2070	2653	11.5	2003.06
RAPT	36.665	119.449	-19.1±1.0	-4.1±0.9	-0.3214	1083	3.3	2010.74
RE89	37.047	121.938	-35.4±1.2	19.8±0.7	0.0000	10	10.2	2001.87
RED_	36.685	120.934	-20.2±2.0	-0.6±1.9	0.0000	4	5.7	1998.88
RH32	35.605	120.261	-34.5±0.3	14.9±0.3	0.0000	27	15.9	1993.35
RIST	36.304	120.898	-39.9±2.4	21.1±1.3	0.0000	13	4.1	2003.39
RNCH	35.900	120.525	-36.3±0.5	19.4±0.4	-0.5745	3098	12.9	2001.60
RNDA	36.279	121.318	-40.1±2.3	24.2±1.4	0.0000	13	4.1	2003.41
ROBA	35.989	119.966	-18.4±1.7	0.8±1.0	0.0000	6	6.3	2002.10
SALE	36.782	121.696	-39.3±1.3	21.5±0.9	0.0000	5	9.0	2003.19
SANS	36.434	121.034	-40.3±2.4	22.7±1.3	0.0000	12	4.1	2003.39
SAOB	36.765	121.447	-39.8±0.3	23.3±0.3	-0.5282	4900	17.0	1997.52
SBEN	36.370	120.645	-20.8±2.5	-1.3±1.8	0.0000	9	4.0	2003.42
SBPC	35.236	120.641	-40.8±4.5	27.8±4.4	0.0000	5	2.5	2007.80
SERP	36.325	120.549	-21.1±2.5	-1.0±1.4	0.0000	8	4.1	2003.42
SHR2	36.030	120.682	-38.1±0.9	22.0±0.5	0.0000	13	15.9	1993.36
SIMM	35.351	120.003	-34.4±1.5	15.0±0.9	0.0000	16	6.6	2003.81
SLO5	35.387	120.146	-35.2±3.1	17.2±1.9	0.0000	6	3.3	2007.08
SLTS	35.133	119.902	-36.7±3.0	16.4±1.7	0.0000	7	3.3	2007.08
SMOK	36.537	121.000	-20.3±2.0	-0.8±1.1	0.0000	3	5.7	1998.88
SMX1	34.899	120.458	-42.6±3.6	22.4±1.9	0.0000	12	2.6	2007.79
SNDY	35.439	120.137	-34.9±4.3	15.7±2.2	0.0000	7	2.2	2007.20
SNI1	33.248	119.524	-44.0±0.6	22.4±0.6	-0.2754	1899	6.2	2008.31

Site code	Lat. ^{o}N	Long. ^{o}E	V_e mm yr^{-1}	V_n mm yr^{-1}	Corr. coeff.	Station days	Time yrs	First obs.
SNLU	35.566	120.160	-35.0±4.4	14.4±2.3	0.0000	8	2.1	2007.22
SOVF	34.609	120.525	-42.2±2.6	24.0±1.4	0.0000	24	17.0	1994.19
SPAR	36.151	120.940	-41.1±2.3	21.8±1.2	0.0000	12	4.4	2003.05
SRES	35.818	120.957	-38.7±0.6	22.0±0.6	-0.3131	806	3.8	2008.50
SRS1	34.004	120.065	-42.0±0.3	24.5±0.3	0.1068	4349	14.1	2000.45
STRO	36.188	120.662	-21.6±2.2	-1.2±1.4	0.0000	12	4.4	2003.05
SWTR	36.228	120.923	-39.3±1.3	23.1±0.7	0.0000	7	8.7	1998.88
SYCA	35.126	119.999	-38.0±2.1	16.8±1.2	0.0000	9	4.7	2007.06
TBLP	35.917	120.360	-24.5±0.3	5.8±0.3	-0.9683	2936	12.3	2001.74
TESS	35.386	120.698	-38.3±0.9	22.9±0.6	0.0000	17	14.5	1993.88
TIGA	36.794	120.923	-21.8±1.3	-0.6±0.8	0.0000	8	8.7	1998.88
TIRZ	34.686	120.267	-41.4±3.5	22.2±1.8	0.0000	3	17.0	1994.18
TLY1	36.346	120.944	-40.2±2.4	22.6±1.3	0.0000	12	4.1	2003.39
TLY2	36.347	120.916	-21.8±2.4	0.3±1.6	0.0000	13	4.1	2003.39
TNLS	35.616	120.203	-34.2±4.4	12.0±2.3	0.0000	7	2.1	2007.22
TUMY	36.611	120.665	-21.7±0.5	-1.2±0.7	0.0000	21	4.0	2003.42
TWR2	35.488	120.018	-31.7±0.3	11.1±0.4	0.0000	17	15.0	1993.35
UCSB	34.413	119.844	-41.3±0.3	19.3±0.3	-0.1654	5174	15.8	1998.77
UG10	36.900	121.299	-23.0±2.0	-0.7±1.1	0.0000	13	5.0	1996.81
UG11	35.468	121.006	-39.7±0.8	25.5±0.5	0.0000	11	14.8	1996.35
UG12	35.708	120.273	-30.2±0.9	13.1±0.6	0.0000	10	12.0	1996.35
UG13	35.535	120.846	-36.8±1.9	21.0±1.3	0.0000	8	5.8	2004.53
UGS1	35.185	120.085	-37.5±2.0	18.6±1.1	0.0000	9	5.0	2006.83
UGS2	35.962	119.977	-20.5±1.5	0.3±0.9	0.0000	15	6.6	2001.81
UGS4	36.893	121.402	-26.4±1.2	0.6±0.8	0.0000	11	9.4	1996.81
UGS5	36.872	121.453	-29.0±0.5	10.2±0.6	0.0000	26	7.4	1996.81
UGS6	37.477	121.556	-24.0±1.2	-2.7±0.7	0.0000	10	8.8	1996.46
UGS8	35.855	120.079	-23.3±0.4	3.9±0.4	0.0000	21	6.3	2002.10
UGS9	36.909	121.462	-29.4±3.4	6.5±1.7	0.0000	6	3.5	1996.81
USLO	35.312	120.661	-39.2±0.3	23.3±0.3	0.4645	4880	13.8	2000.74
V616	35.653	120.216	-35.2±4.9	8.4±2.5	0.0000	2	2.1	2007.23
VAN1	34.827	120.564	-41.6±0.4	23.4±0.4	0.0118	3152	9.1	1999.15
VNDP	34.556	120.616	-42.8±0.3	23.2±0.3	0.1356	5921	18.7	1995.86
WD42	35.763	120.469	-33.5±1.1	19.5±0.7	0.0000	5	11.4	1993.88
WFLG	35.947	121.065	-36.5±2.5	18.5±1.5	0.0000	11	4.1	2003.41
WLHL	35.973	121.004	-40.1±0.7	22.9±0.7	-0.0125	553	2.9	2009.85
YEGU	35.533	120.038	-29.8±4.2	8.7±2.3	0.0000	10	2.1	2007.20
Z558	35.334	119.844	-31.0±1.0	10.2±0.7	0.0000	6	11.8	1998.50

V_n and V_e are the north and east velocity components in ITRF08. The correlation coefficient specifies the correlation between the north and east velocity variances and is well approximated only for the continuous stations. Station days indicates the number of days that were used to estimate a station's velocity. Time specifies the interval spanned by the data, beginning at the time specified in the final column.

Table 2: Campaign station earthquake offset information

Site	San Simeon		Parkfield	
code	East	North	East	North
	mm	mm	mm	mm
0508	-31.7	-55.7	-17.3	-0.8
0510	-4.9	-15.3	-4.2	-2.0
05QJ	-13.4	-36.8	-15.3	-0.0
05SH	-3.3	-14.4	-5.8	-0.3
05SK	-6.5	-15.5	-1.8	-7.3
AKRS	-4.1	-11.5	-0.2	-6.8
ALVS	-1.0	-6.1	-1.9	-1.1
AQDT	-3.1	-3.5	-0.6	-2.4
BITT	-1.6	-8.1	-1.1	-2.2
CANX	-2.6	-9.2	-0.3	-4.5
CHLN	-0.9	-5.9	-1.3	-1.4
CRVO	-3.0	-7.0	-0.0	-6.0
CVM1	-2.9	-8.2	-0.1	-6.6
DTOG	-8.2	-14.2	-0.6	-9.9
EADE	-5.4	-19.8	-9.2	0.4
GRIG	-8.8	-25.9	-13.7	0.9
GRIS	-2.3	-8.0	-0.1	-4.7
GRSW	-2.3	-8.0	-0.1	-4.7
HEPS	-3.1	-11.1	-1.2	-3.6
HNDZ	-3.0	-10.1	-0.5	-4.5
HOME	-2.1	-10.0	-2.5	-1.5
LEY_	-1.9	-8.1	-0.6	-3.1
MADS	-4.7	-16.0	-5.8	-0.7
MEE3	-5.1	-15.5	-4.2	-2.2
MEE4	-6.2	-15.4	-3.6	2.0
NAPO	–	–	-7.0	-9.0
NINO	-2.0	-10.2	-3.3	-0.9
NWID	-3.1	-9.2	-0.0	-6.5
PANC	-1.5	-6.1	-0.1	-3.5
PFYF	-5.5	-14.8	-2.2	-5.1
PHEL	-6.1	-8.9	-0.0	-8.0
RED_	-1.1	-5.8	-0.2	-2.7
RIST	-2.7	-10.8	-1.9	-2.4
RNDA	-1.0	-5.2	-2.4	-0.8
SANS	-1.4	-7.4	-1.1	-2.0
SBEN	-3.6	-10.0	0.1	-7.6
SERP	-4.2	-8.5	-0.2	-6.5
SMOK	-1.3	-6.6	-0.6	-2.4
SPAR	-3.8	-15.3	-6.0	-0.2
STRO	-6.5	-14.9	-0.6	-9.9
SWTR	-3.1	-12.7	-3.6	-1.3
TIGA	-1.0	-5.2	-0.1	-2.6

Site	San Simeon		Parkfield	
code	East	North	East	North
code	mm	mm	mm	mm
TLY1	-2.1	-9.5	-1.6	-2.2
TLY2	-2.3	-9.7	-1.4	-2.5
TUMY	-2.0	-6.9	-0.1	-4.4
WFLG	-3.4	-19.8	-15.3	-0.0

This table gives calculated offsets for the cumulative coseismic and postseismic movements at numerous campaign sites in the study area for the Dec. 22, 2003 San Simeon and Sep. 28, 2004 Parkfield earthquakes. Prior to inverting the position time series for the listed GPS sites, these offsets were applied as instantaneous *a priori* adjustments to the campaign station coordinates for times after each earthquake. Further information is given in the supplementary text.