U. S. Department of the Interior
U. S. Geological Survey

Corrections to "Estimating Earthquake Location and Magnitude from Seismic Intensity Data"

by

W. H. Bakun and C. M. Wentworth
U.S. Geological Survey
345 Middlefield Rd. MS977
Menlo Park CA 94025

Open-File Report 98-614

1998

Abstract

The confidence parameters in Table 5 and Figures 7 -12 in Bakun and Wentworth (1997) were calculated using the site corrections for $M_I^{(4)}$ rather than Bakun and Wentworth's (1997) preferred relation $M_I^{(3)}$. The conclusions of Bakun and Wentworth (1997) are not changed by these corrections. The corrected Table 5 and Figures are in this report and at *http://quake.wr.usgs.gov/~bakun/.*

Corrected Table 5
Confidence Parameters

a) Location of Epicentral region

No. of MMI	rms[M_i] Contour 95%	90%	80%	67%	50%
5	0.566	0.454	0.335	0.247	0.173
7	0.488	0.385	0.281	0.205	0.141
10	0.403	0.312	0.226	0.162	0.108
15	0.315	0.243	0.171	0.116	0.075
20	0.257	0.195	0.133	0.091	0.058
25	0.224	0.167	0.113	0.075	0.048
30	0.197	0.145	0.099	0.065	0.041
40	0.161	0.121	0.082	0.054	0.034
50	0.143	0.106	0.072	0.049	0.030
60	0.132	0.099	0.068	0.045	0.028
70	0.121	0.092	0.063	0.043	0.026
80	0.115	0.088	0.059	0.040	0.025
90	0.111	0.083	0.057	0.038	0.024
100	0.105	0.081	0.055	0.037	0.023
110	0.102	0.078	0.054	0.036	0.023
120	0.099	0.076	0.053	0.035	0.023
130	0.097	0.074	0.051	0.035	0.022
150	0.093	0.072	0.049	0.034	0.022
170	0.090	0.070	0.048	0.033	0.021

Corrected Table 5 (Continued)
Confidence Parameters

(b) **M**

No. of MMI	Limits				
	95%	90%	80%	67%	50%
1	-1.22 , 0.94	-0.93 , 0.76	-0.64 , 0.61	-0.42 , 0.44	-0.26 , 0.3
2	-0.84 , 0.66	-0.67 , 0.55	-0.49 , 0.43	-0.34 , 0.33	-0.21 , 0.23
3	-0.71 , 0.56	-0.57 , 0.47	-0.42 , 0.37	-0.30 , 0.29	-0.20 , 0.2
4	-0.63 , 0.49	-0.51 , 0.41	-0.38 , 0.33	-0.27 , 0.25	-0.18 , 0.18
5	-0.58 , 0.45	-0.47 , 0.38	-0.35 , 0.3	-0.25 , 0.23	-0.16 , 0.17
7	-0.50 , 0.39	-0.41 , 0.33	-0.31 , 0.26	-0.23 , 0.21	-0.15 , 0.15
10	-0.45 , 0.35	-0.37 , 0.29	-0.29 , 0.24	-0.21 , 0.18	-0.14 , 0.13
15	-0.39 , 0.3	-0.34 , 0.26	-0.26 , 0.21	-0.20 , 0.17	-0.13 , 0.12
20	-0.36 , 0.27	-0.31 , 0.24	-0.25 , 0.19	-0.19 , 0.16	-0.13 , 0.12
25	-0.35 , 0.26	-0.29 , 0.22	-0.24 , 0.18	-0.19 , 0.15	-0.13 , 0.11
30	-0.33 , 0.24	-0.29 , 0.21	-0.24 , 0.17	-0.19 , 0.14	-0.13 , 0.11
40	-0.31 , 0.22	-0.27 , 0.2	-0.23 , 0.16	-0.18 , 0.14	-0.13 , 0.11
50	-0.30 , 0.21	-0.27 , 0.19	-0.22 , 0.16	-0.18 , 0.13	-0.13 , 0.11
60	-0.29 , 0.21	-0.26 , 0.18	-0.22 , 0.15	-0.18 , 0.13	-0.13 , 0.11
70	-0.28 , 0.2	-0.25 , 0.17	-0.22 , 0.15	-0.18 , 0.13	-0.13 , 0.11
80	-0.28 , 0.19	-0.25 , 0.17	-0.21 , 0.15	-0.18 , 0.13	-0.13 , 0.11
90	-0.27 , 0.19	-0.24 , 0.17	-0.21 , 0.14	-0.18 , 0.12	-0.14 , 0.1
100	-0.27 , 0.18	-0.24 , 0.17	-0.21 , 0.14	-0.18 , 0.12	-0.14 , 0.1
110	-0.26 , 0.18	-0.24 , 0.16	-0.21 , 0.14	-0.18 , 0.12	-0.14 , 0.1
120	-0.26 , 0.18	-0.24 , 0.16	-0.21 , 0.14	-0.18 , 0.12	-0.14 , 0.1
130	-0.26 , 0.18	-0.24 , 0.16	-0.21 , 0.14	-0.18 , 0.12	-0.14 , 0.1
150	-0.25 , 0.17	-0.23 , 0.16	-0.21 , 0.13	-0.18 , 0.12	-0.14 , 0.1
170	-0.25 , 0.17	-0.23 , 0.15	-0.21 , 0.13	-0.18 , 0.12	-0.14 , 0.1

Entries for 1, 2, 3, and 4 MMI have been added to Table 5b.

Since the site corrections for $M_I^{(3)}$ and $M_I^{(4)}$ are correlated (correlation coefficient = 0.69), only the details of Figures 7 - 12 are changed. The conclusions of the paper are not changed by these corrections.

References

Bakun, W. H. and C. M. Wentworth (1997). Estimating earthquake location and magnitude from seismic intensity data, *Bull. Seism. Soc. Am.* **87**, 1502-1521.

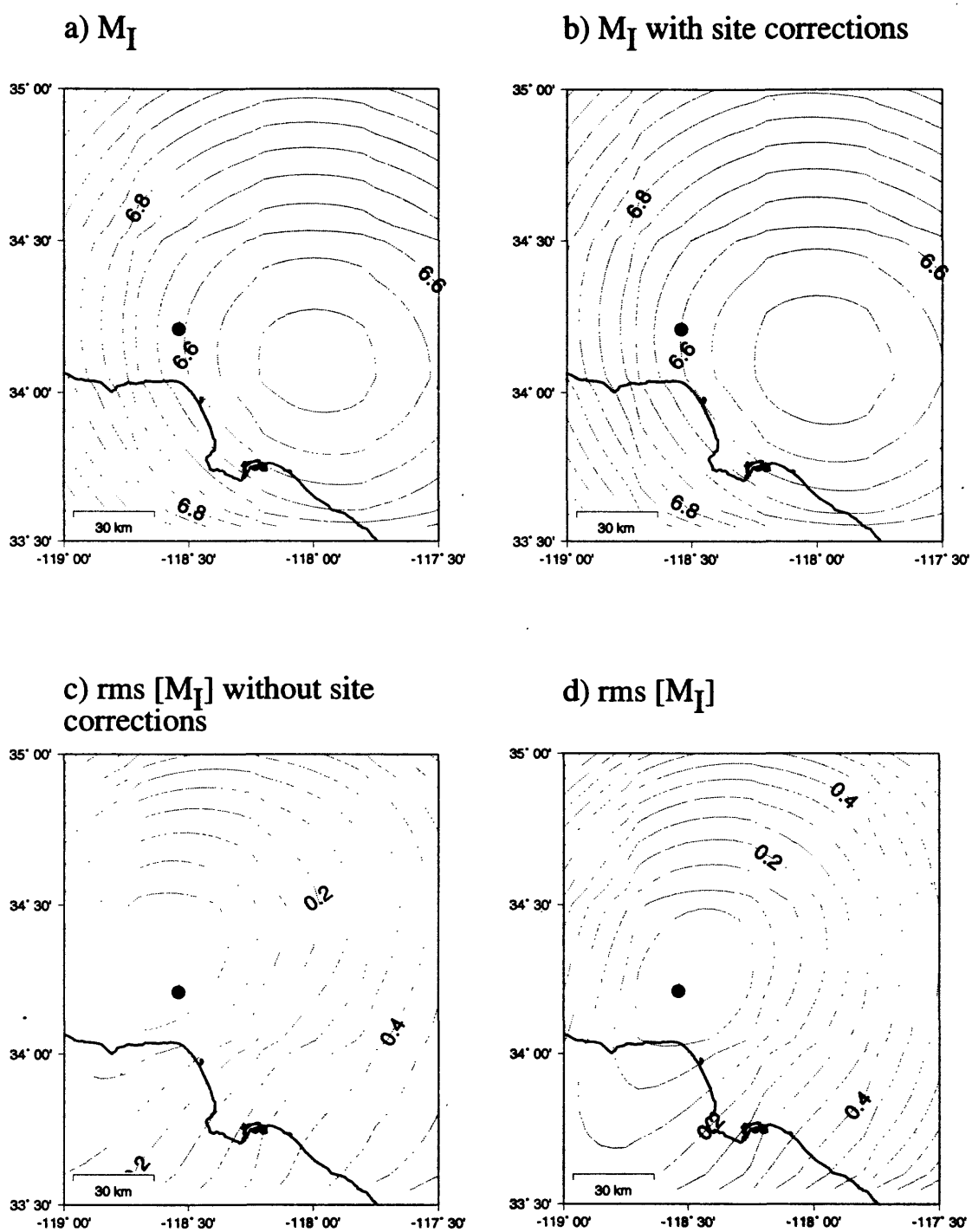


Figure 7. Maps of contours of M_I in a) and b) and rms [M_I] in c) and d) as thin lines for the M = 6.7 Northridge earthquake for a 5-km-spaced grid of assumed epicenters. The contour interval is 0.05. California coastline is shown as a thick line. The solid circle is the instrumental epicenter of the Northridge earthquake.

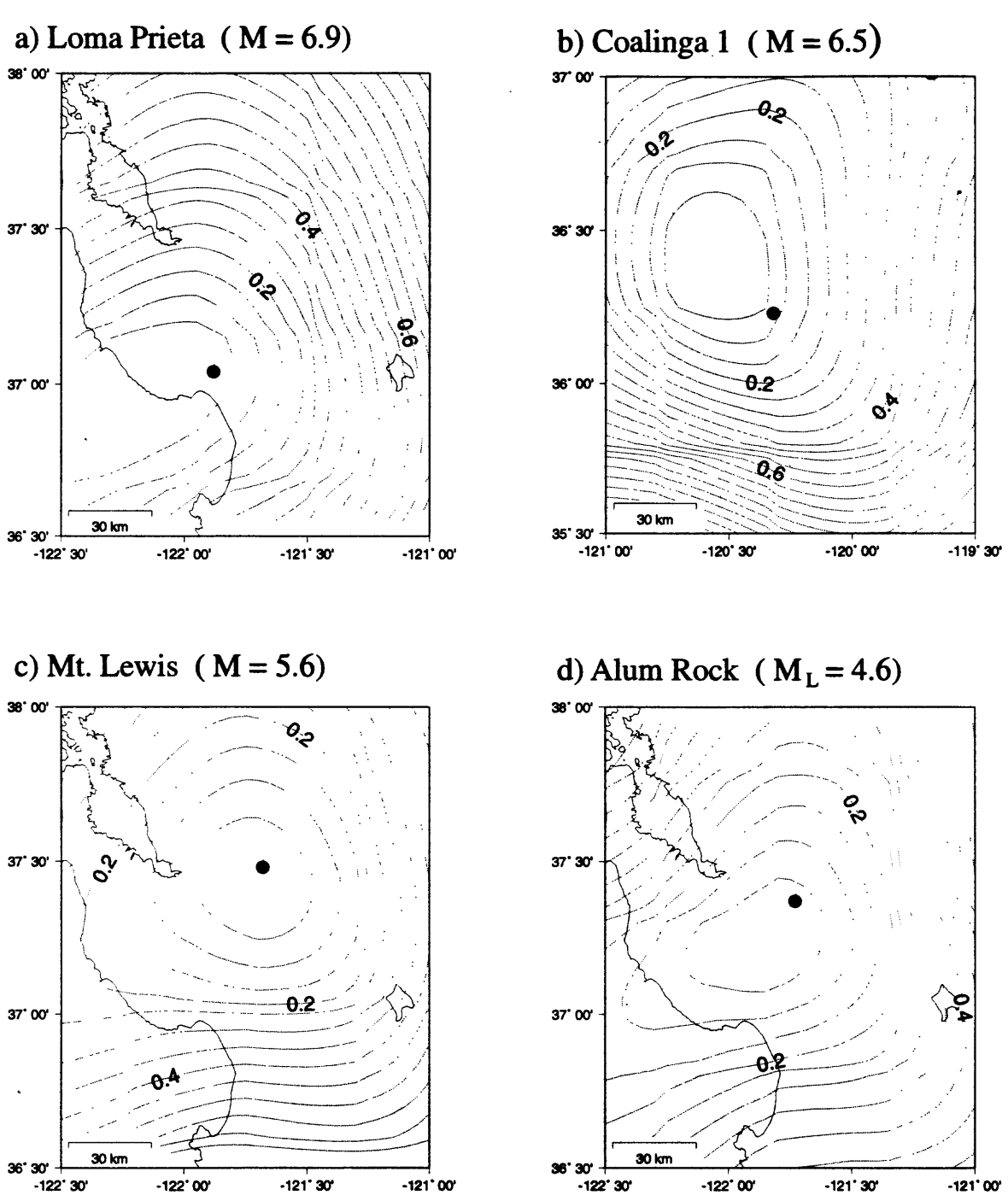


Figure 8. Maps of rms [M_l] for a) Loma Prieta, b) Coalinga 1, c) Mt. Lewis, and d) Alum Rock earthquakes. Dots are the instrumental epicenters. See caption of Figure 7.

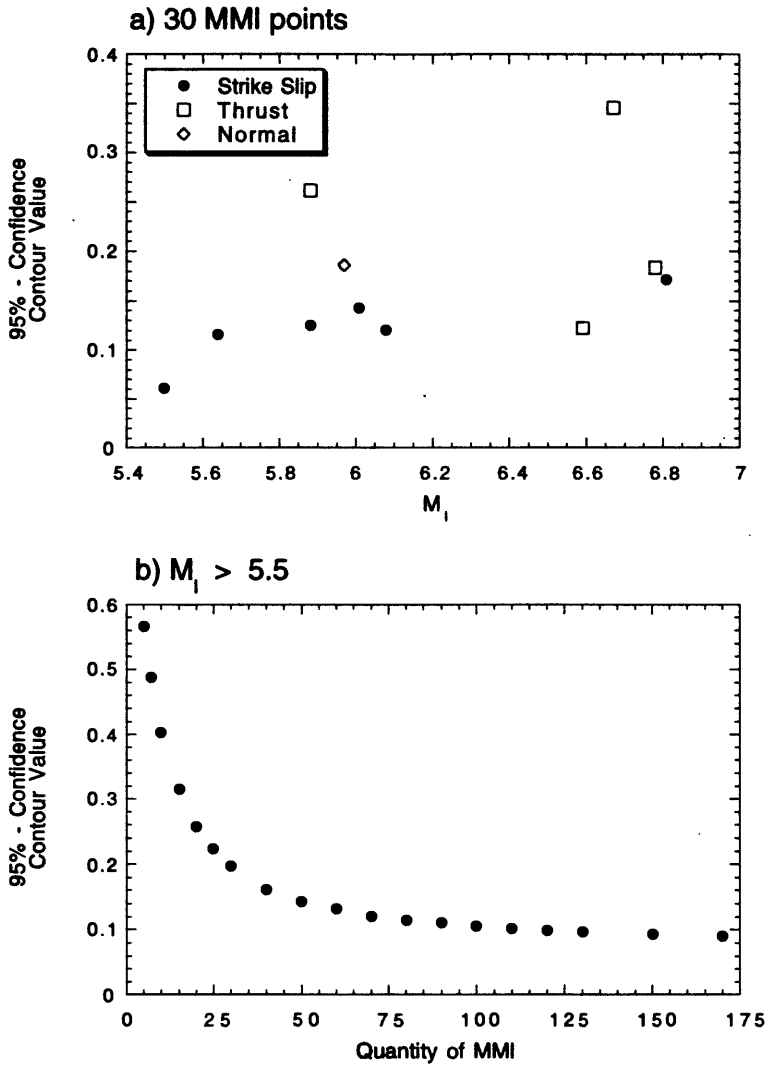


Figure 9. 95%-confidence level contour values of rms [M_l]. a) for 30 MMI shown as dots, open squares, and open diamonds for strike slip (including Loma Prieta), thrust, and normal faulting training-set events respectively. b) for different quantities of MMI data.

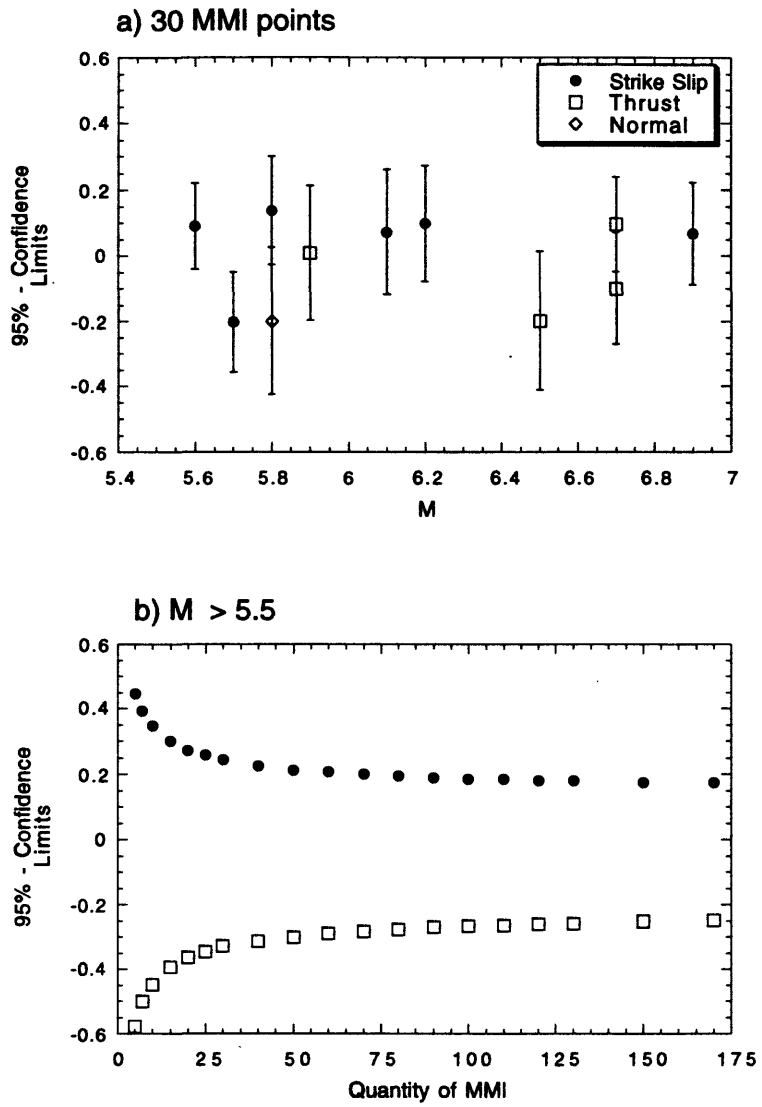


Figure 10. 95%-confidence limits of M. a) for 30 MMI shown as dots, open squares, and open diamonds for strike slip (including Loma Prieta), thrust, and normal faulting training-set events respectively. b) for different quantities of MMI data.

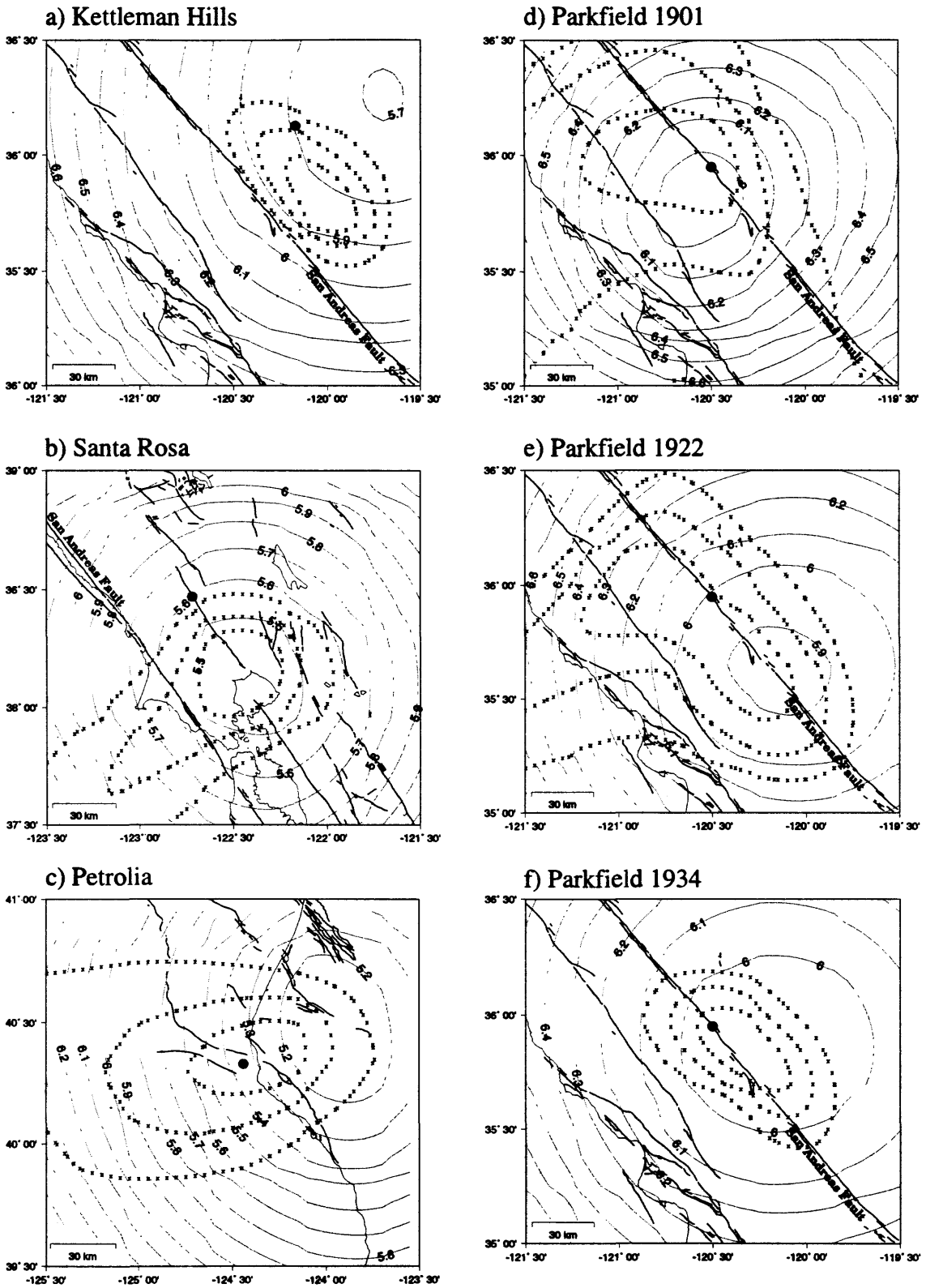
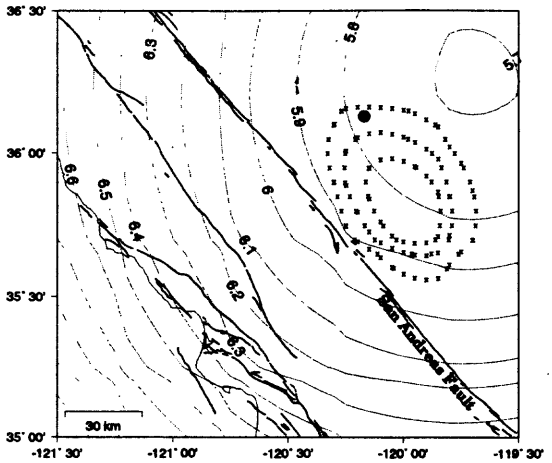
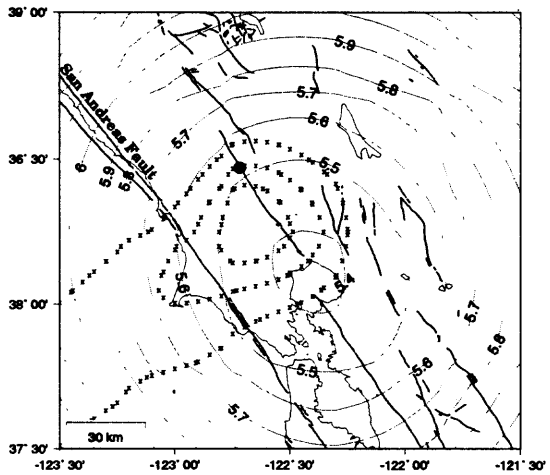


Figure 11. Maps of contours of M_l as thin dashed lines and instrumental epicenters as dots for a) Kettleman Hills, b) Santa Rosa, c) Petrolia, d) 1901 Parkfield, e) 1922 Parkfield, and f) 1934 Parkfield earthquakes. The epicenter of the 1966 Parkfield event is the epicenter plotted in d), e), and f). The rms [M_l] contours corresponding to the 50%-, 80%-, and 95%-confidence levels for location are shown as the innermost, middle, and outermost contours of Xs respectively. We used the contour values listed in Table 5 for 170 MMI in a) and b), 40 MMI in c), 10 MMI in d), 15 MMI in e), and100 MMI in f). California coastline and < 700ka Quaternary faults (Jennings, 1992) are shown as thin and thick lines respectively. See caption of Figure 7.

a) Kettleman Hills



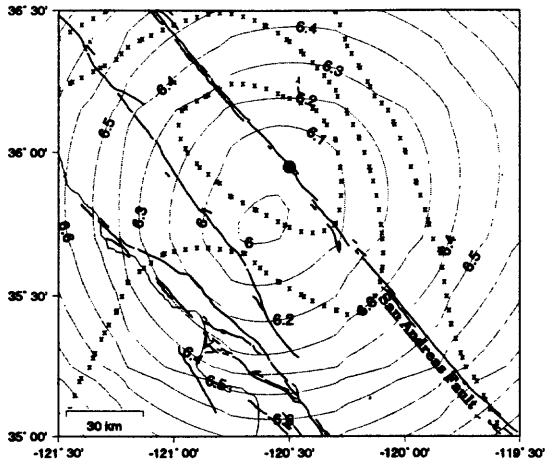
b) Santa Rosa



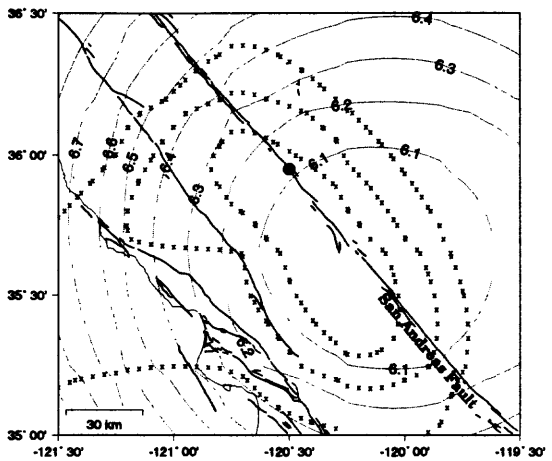
c) Petrolia

(Same as Figure 11c)

d) Parkfield 1901



e) Parkfield 1922



f) Parkfield 1934

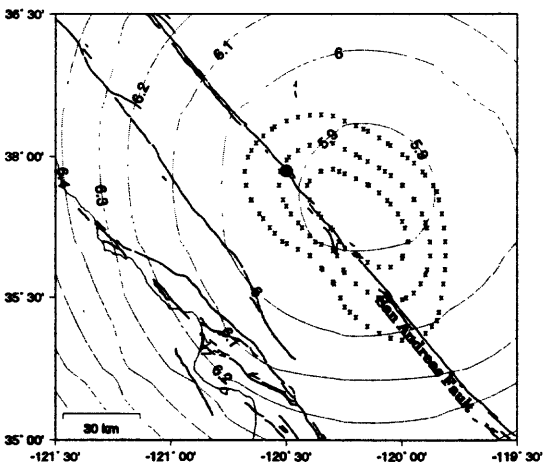


Figure 12. Maps of contours of M_l and rms [M_l] without applying site corrections. See caption of Figure 11.