quakes in our data base and compare these results to data from the rest of the world. Because the SCR data sets for surface rupture length and displacement relationships contain only six to seven earthquakes and the correlations are low ($r < 0.75$), these relationships are not significant at a 95% probability level and are not considered further. Relationships for magnitude versus subsurface rupture length, magnitude versus rupture width, and magnitude versus rupture area comprise 18, 17, and 17 earthquakes, respectively, are well correlated ($r > 0.9$), and are significant at a 95% probability level. Comparing SCR regression coefficients to non-SCR coefficients shows that the rupture area regressions differ at a 95% significance level, whereas the subsurface rupture length and rupture width regression coefficients do not differ at a 95% significance level. We note, however, that the difference in expected magnitudes generally is small (less than 0.2 **M**) for these regressions (Fig. 17). These results indicate that subdividing our data set according to various tectonic settings or geographic regions does not greatly improve the statistical significance of the regressions.

Discussion

The primary purpose of developing regression relationships among various earthquake source parameters is to predict an expected value for a dependent parameter from an observed independent parameter. Because we calculate the regressions by the method of ordinary least squares, the coefficients presented in Table 2 are for estimating the dependent variable. The independent and dependent variables will depend on the application—either the expected magnitude for a given fault parameter, or the expected fault parameter for a given magnitude. Table 2 gives the normal and inverted regression coefficients as a function of the sense of slip.

Note that the values of dependent variables derived from these regression formulas are *expected* values. Thus, the calculated values are expected to be exceeded in 50% of the earthquakes associated with the given value of the independent variable. Bonilla *et al.* (1984) discuss techniques for evaluating dependent variables at lower exceedance probabilities. In addition, the formulas in Table 2 are not applicable to values of the independent variable that lie outside the data range listed for each regression.

The empirical relationships presented here can be used to assess maximum earthquake magnitudes for a particular fault zone or an earthquake source. The assumption that a given magnitude is a *maximum* value is valid only if the input parameter, for instance the rupture length, also is considered a maximum value. For example, suppose we are interested in assessing the maximum magnitude that a fault is capable of generating, and that we have sufficient data to estimate the possible length and downdip width of future ruptures. Evaluating the segmentation of a fault zone (e.g., Schwartz and Copper-

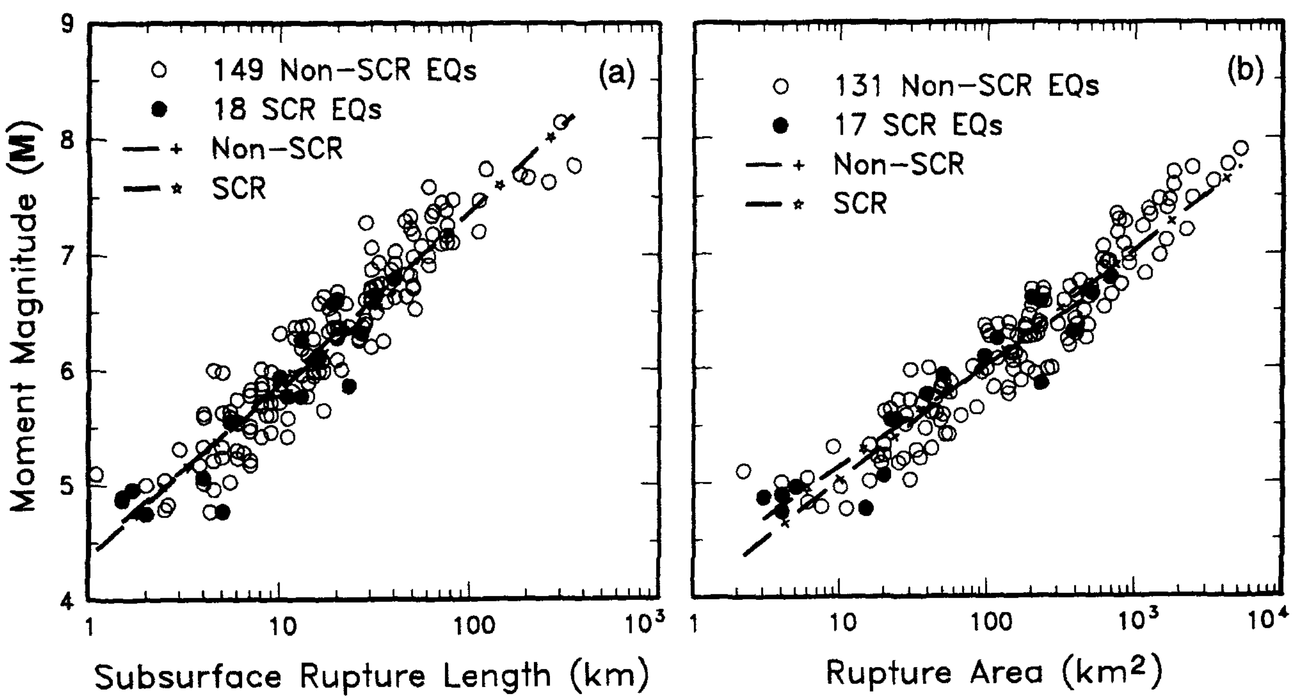

Figure 17. Regression lines for stable continental region (SCR) earthquakes and non-SCR continental earthquakes. (a) Regression of surface rupture length on magnitude (**M**). (b) Regression of rupture area on magnitude (**M**).