a dashed line in Figure 4) is:

$$I_{mm} = 2.10\ log(PGV) + 3.40 \quad (4)$$

Table 1 gives the peak ground motion ranges that correspond to each unit Modified Mercalli intensity value according to our regression of the observed peak ground motions and intensities for California earthquakes.

Table 1. Ranges of ground motions for Modified Mercalli Intensities

Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X+
Peak Accel. (% g)	<0.17	0.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
Peak Velocity (cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116

DISCUSSION

For a given ground motion level, our intensities are lower than the commonly used relationships of Trifunac and Brady (1975), which are also displayed on Figures 3 and 4. Only data from the 1971 San Fernando earthquake are common; our data are from 1971 forward, while that of Trifunac and Brady (1975) contains data from the San Fernando and prior earthquakes. In general, the main differences are due to the addition of new data since the Trifunac and Brady (1975) study. However, for acceleration, part of the difference is that we do not include the intensity IX (or larger) values in the regression, due to the evidence of amplitude saturation, whereas Trifunac and Brady (1975) used an intensity X value. Likewise, for velocity, we did not use lower intensity values ($I_{mm} \leq$ IV) for the regression whereas Trifunac and Brady (1975) did so.

It is notable that the relationship of Trifunac and Brady (1975) indicated lower intensities for a given ground motion level than most earlier estimates (see Trifunac and Brady, 1975, Figure 3), and now our relationship indicates yet lower intensity levels associated with the same peak ground motion. There are a number of factors that may influence this trend, and certainly more densely spaced recordings in the near-fault region of the recent events, particularly for the Northridge earthquake, do presumably favor a more accurate portrayal of the relationship. However, building practices have certainly improved since the earlier events, altering the association of shaking and damage, and there are fewer brittle structures that are easily damaged at moderate levels of ground acceleration. Hence, it may be natural that such empirical relationships change with time, though further examination of this trend is in order.

The relationships we have developed are now used to generate maps of estimated shaking intensities within a few minutes of the event based on the recorded peak motions (see Wald et al., 1999a). In practice, we compute the I_{mm} from the I_{mm} verses PGA relationship; if the intensity value determined from peak acceleration is $\geq$ VII, we then use the value of I_{mm} derived from the I_{mm} verses PGV relationship. These maps provide a rapid portrayal of the extent of potentially damaging shaking following an earthquake and can be used for emergency response, loss estimation, and for public information through the media.