ADDENDUM

FIGURES FOR PAUL SOMERVILLE'S 12WCEE STATE-OF-THE-ART PAPER "SEISMIC HAZARD EVALUATION"

published in Vol. 33, No. 3, September 2000, pp 325-346.

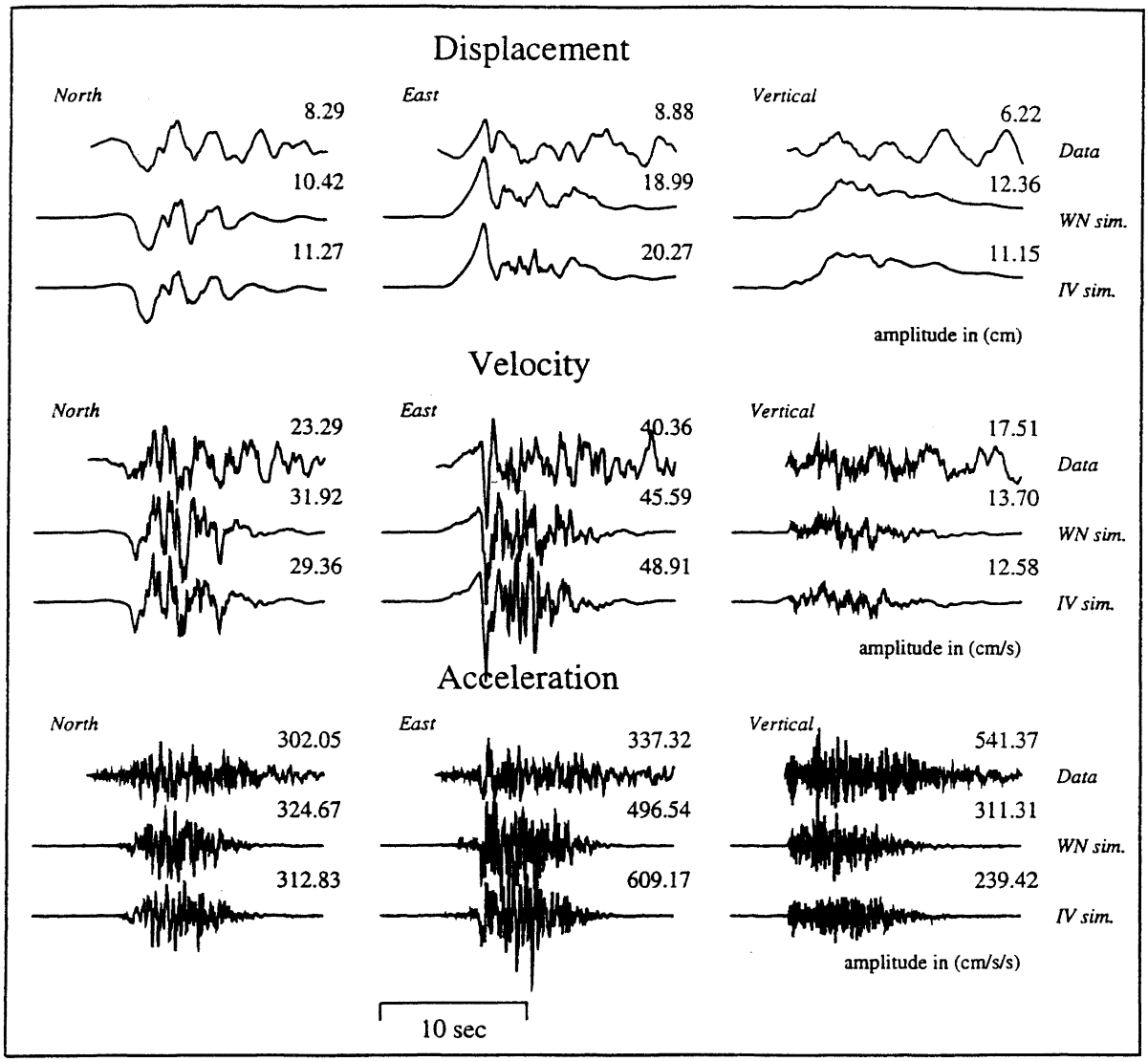

Figure 1: Comparison of recorded (top row) and simulated (middle and bottom rows) displacement, velocity and acceleration time histories at Arleta from the 1994 Northridge earthquake, plotted on a common scale, with peak value given in the top left corner. Source: Somerville et al. (1995).

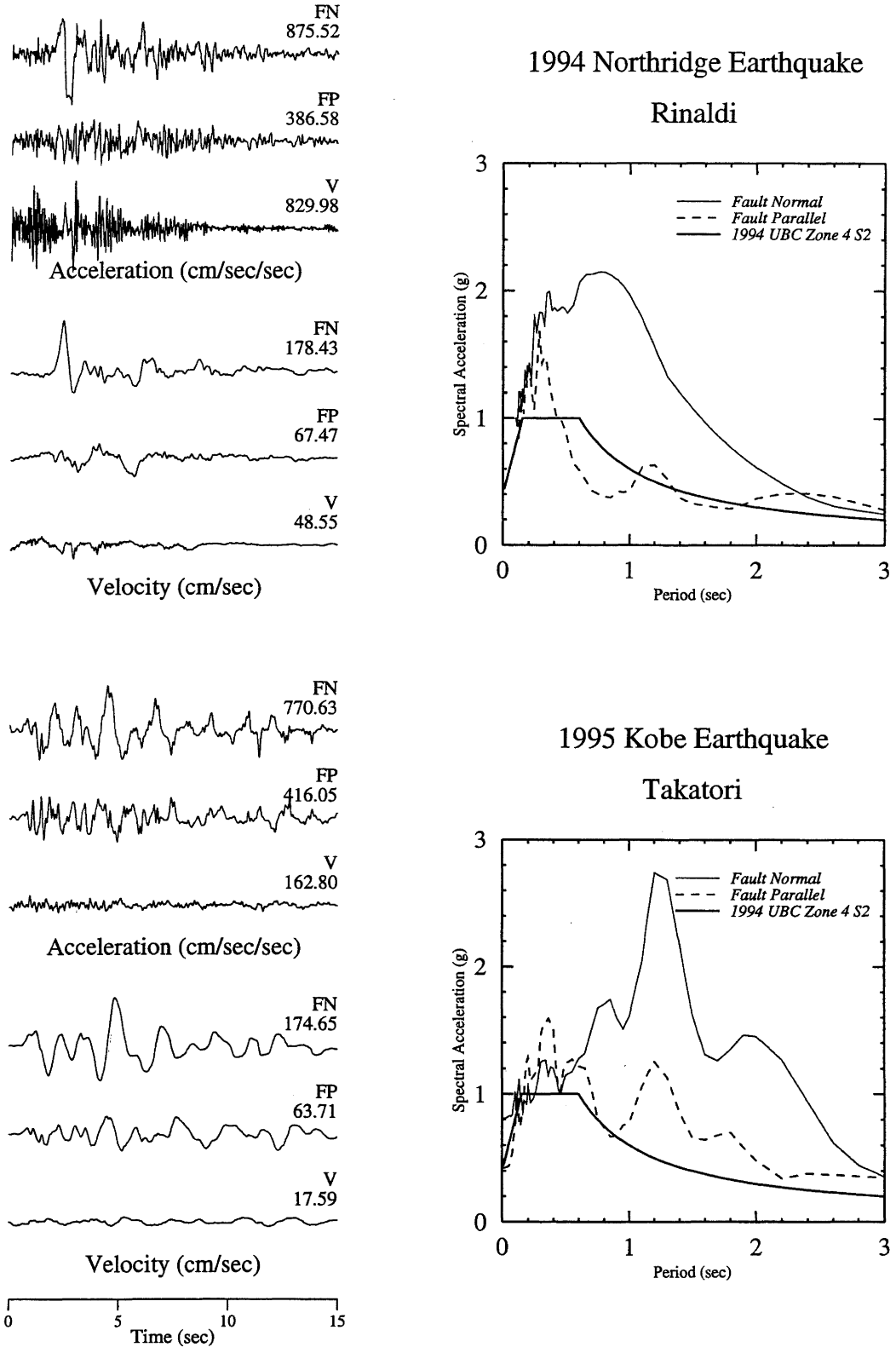

Figure 2: Near fault acceleration and velocity time histories (left) and response spectra (right) recorded during the 1994 Northridge and 1995 Hyogo-ken Nambu (Kobe) earthquakes.

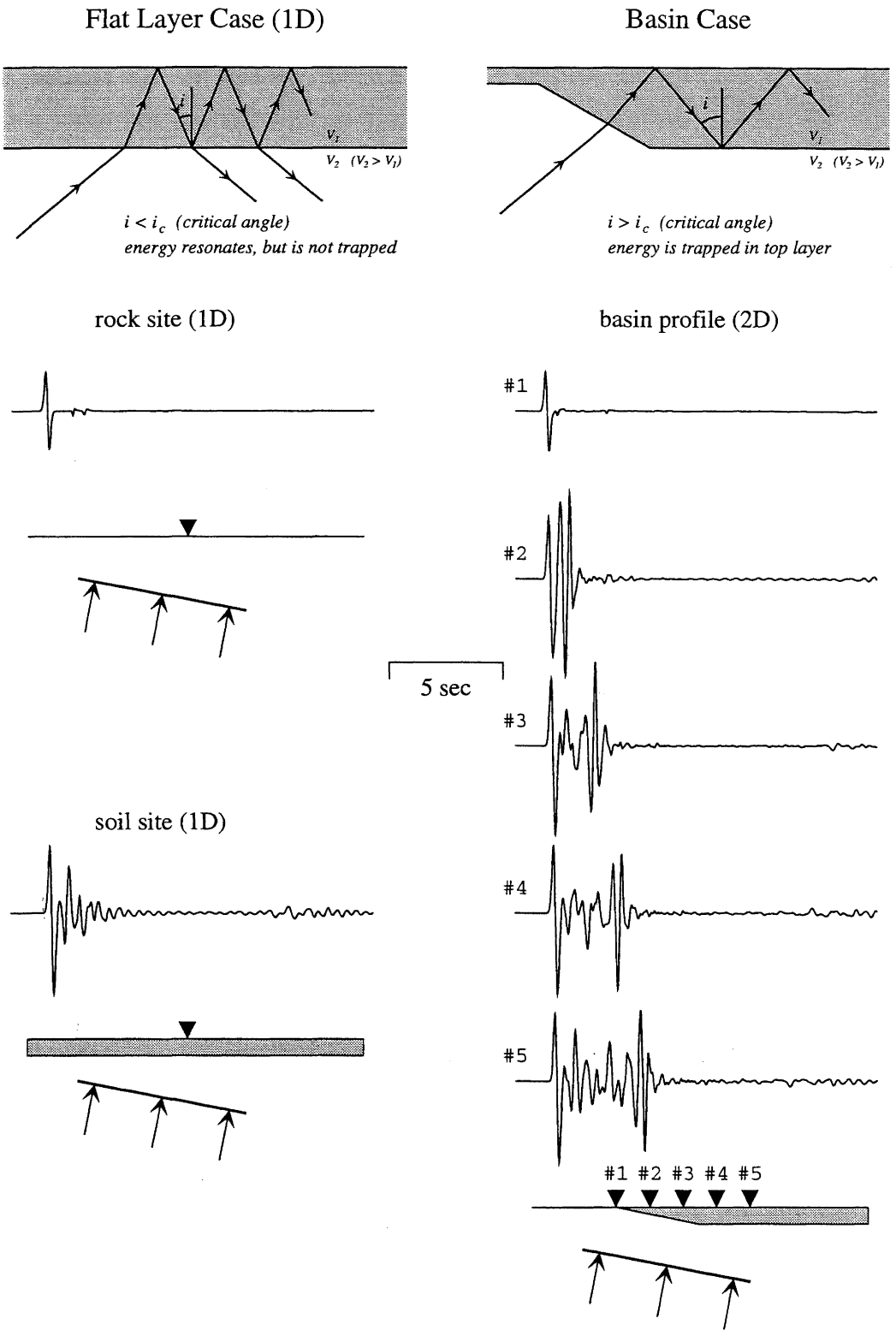

Figure 3: Schematic diagram showing that seismic waves entering a sedimentary layer from below can escape if the layer is flat (upper figure), but can become trapped in the layer if it has varying thickness (as in the case of a basin) and the waves enter it through its edge. Source: Graves, 1993.

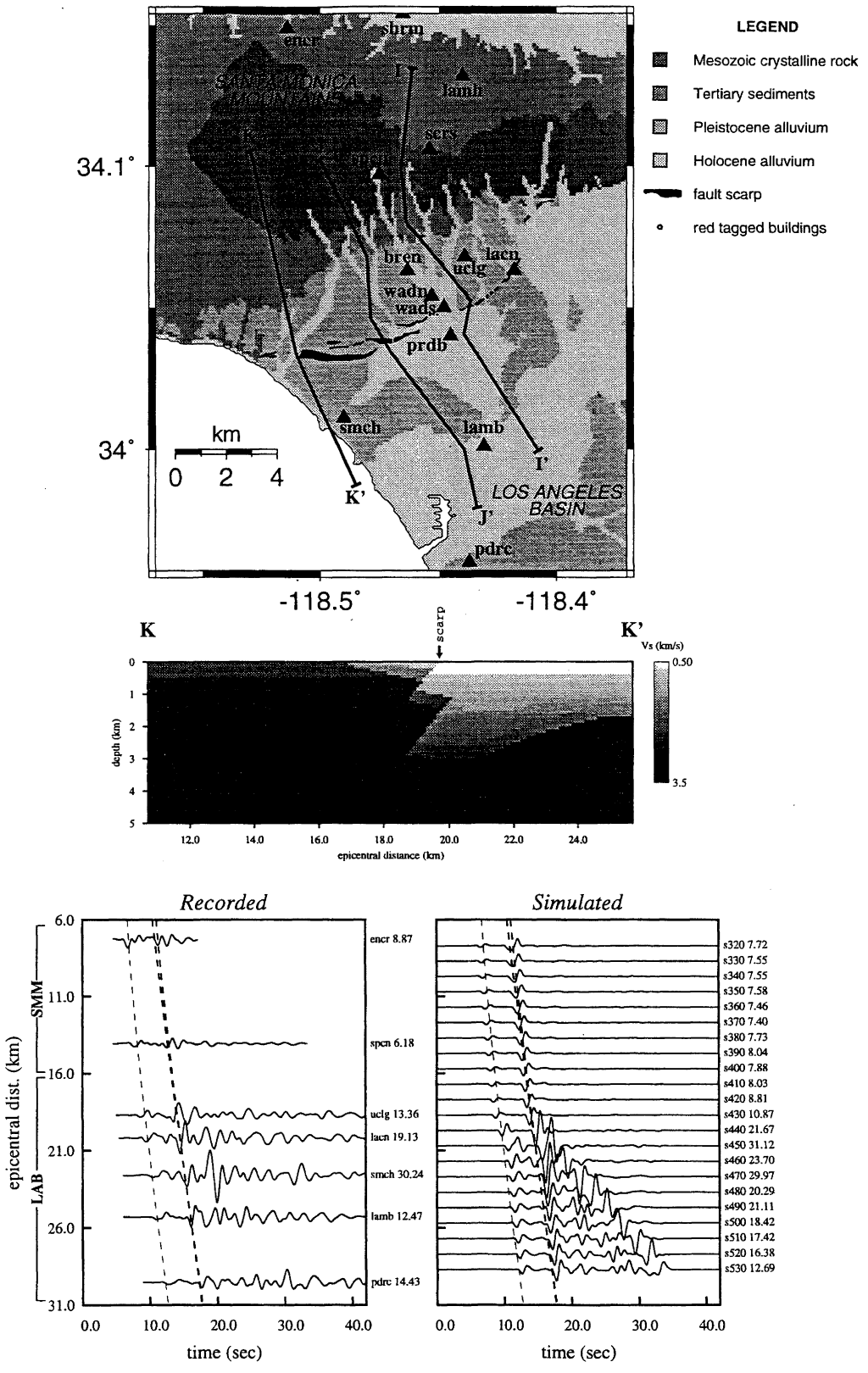

Figure 4: Basin edge effects in Santa Monica during the 1994 Northridge earthquake. Large ground motions and associated damage occurred immediately south of the active strand of the Santa Monica fault. Graves et al.(1998).

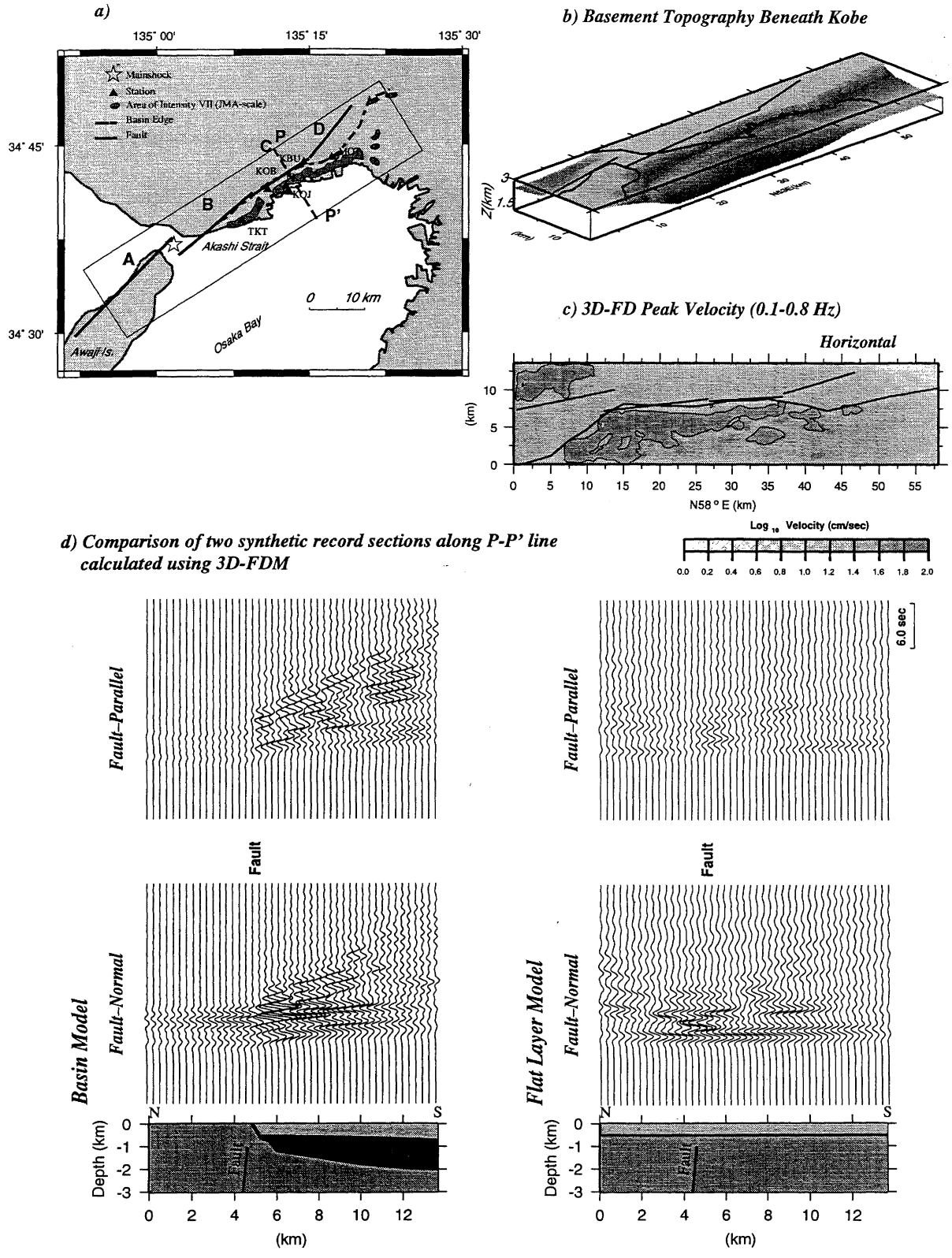

Figure 5: Basin edge effects in the 1995 January 17, Hyogo-ken Nanbu earthquake. Source: Pitarka et al.(1998).

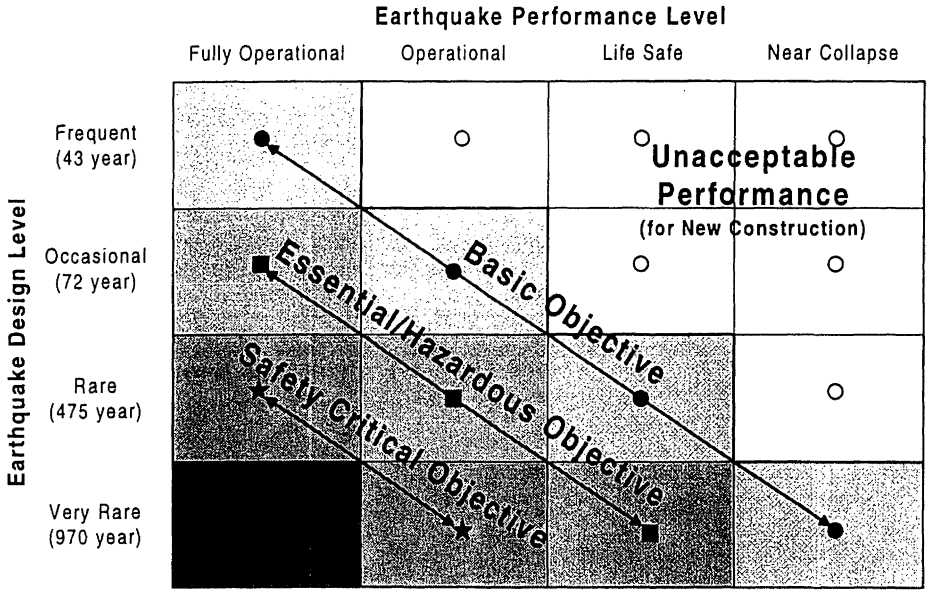

Figure 6: Recommended seismic performance objectives for buildings, showing increasingly undesirable performance characteristics from left to right on the horizontal axis and increasing level of ground motion from top to bottom on the vertical axis. Performance objectives for three categories of structures are shown by the diagonal lines. Source: SEAOC (1996).

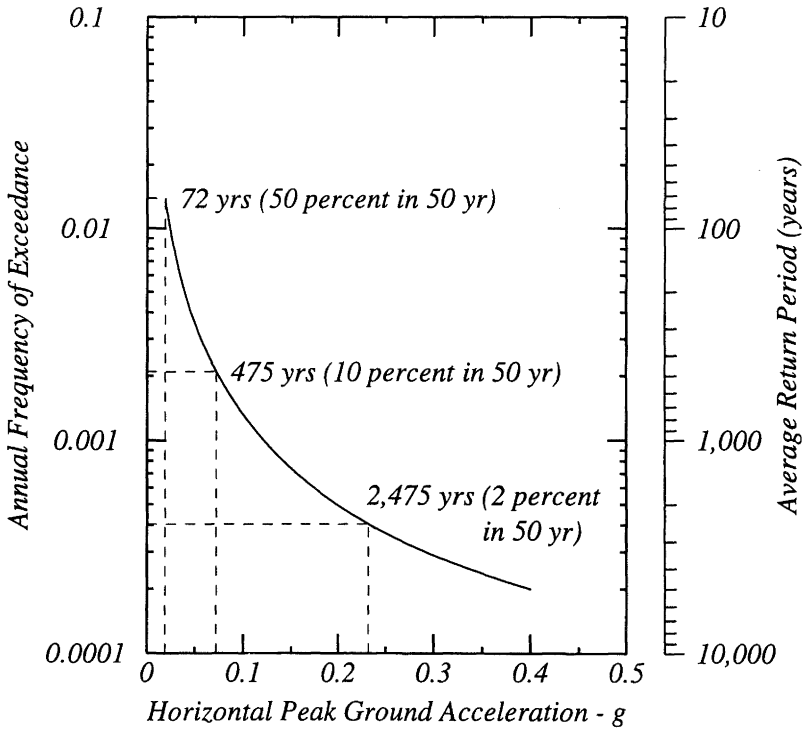

Figure 7: Seismic hazard curve for Boston, showing the decrease in annual frequency of exceedance (or increase in average return period) as the peak acceleration increases. The hazard curve is from the USGS National Seismic Hazard Maps (Frankel et al. (1996)), modified for soil site conditions.

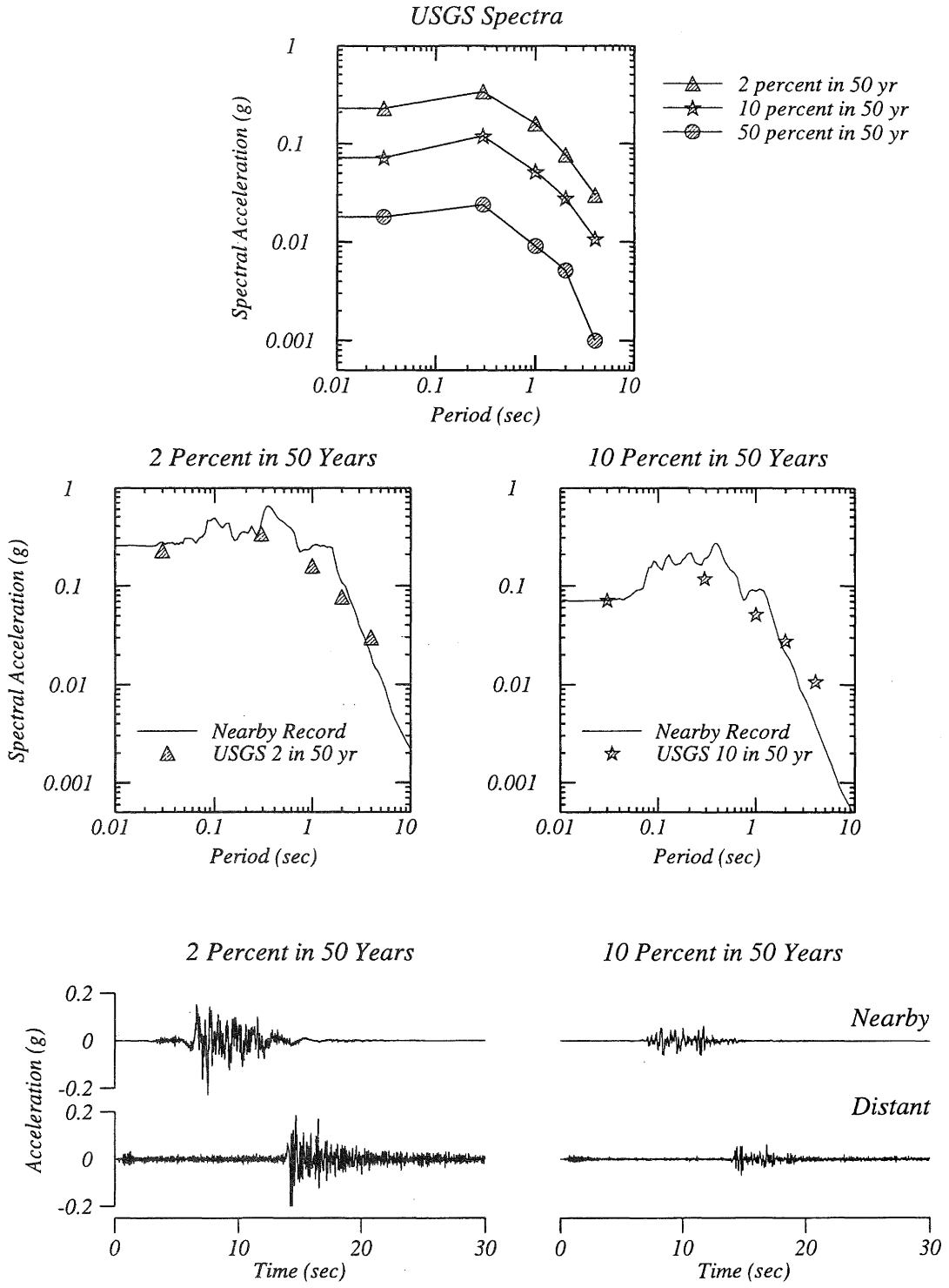

Figure 8: Top: Probabilistic response spectra for three frequencies of exceedance from the USGS National Seismic Hazard Maps, modified for soil site conditions. Middle: Response spectra of scaled simultations of small nearby earthquakes selected to represent the probabilistic spectra for 2% in 50 years and 10% in 50 years. Bottom: Scaled simulations of small nearby earthquakes and larger more distant earthquakes used to represent the probabilistic spectra for 2% in 50 years and 10% in 50 years.

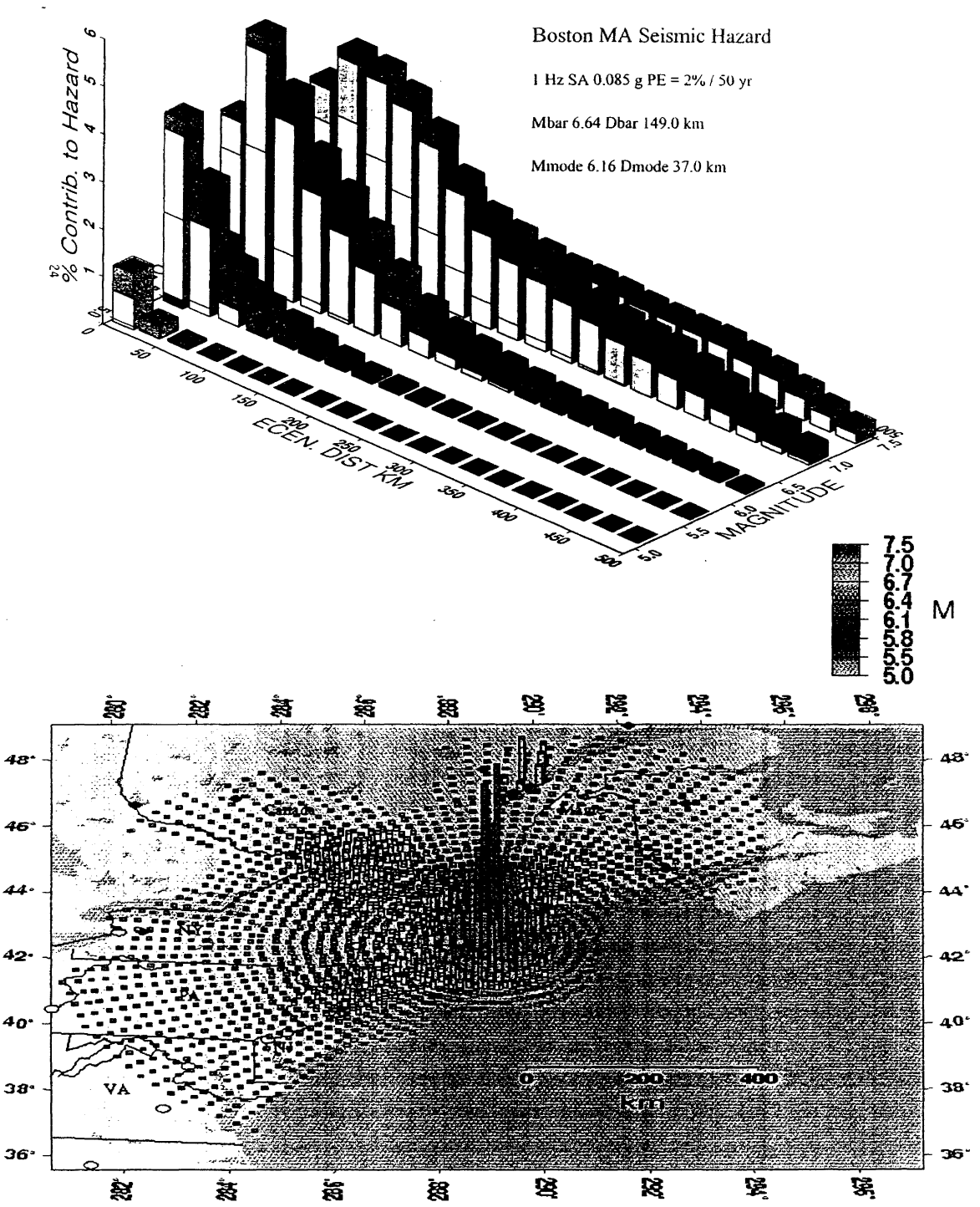

Figure 9: Deaggregation of the seismic hazard in Boston for response spectral acceleration at 1 second period for a probability of exceedance of 2% in 50 years. The histogram (top) shows the deaggregation by magnitude, distance, and ε (with ε values decreasing from more than 2, 1 to 2, 0 to 1, and –1 to 0 from top to bottom of the columns. The map (bottom) shows the geographical distribution of earthquakes by magnitude and distance from Boston, with the four tall dark columns in the center representing contributions from nearby magnitude 5.5 earthquakes, the adjacent mid height lighter columns representing contributions from more distant magnitude 6.5 earthquakes, and the surrounding short columns representing contributions from distant earthquakes with magnitudes up to 7.5. Source (in colour): http:/geohazards.cr.usgs.gov/eq (USGS website).