Fig. 5.9 Earthquake Intensities and Magnitudes

Mercalli Intensity

Lisbon 1755 ~ 100,000 fatalities

oldest scale (1902)twelve points

reported damage

not a measure for EQ size

I: not feltII: felt by only few people at rest suspended objects may swing

V: felt indoors by nearly everyone some broken dishes, minor cracks in plaster

XII: damage nearly total objects thrown up in air

The Historical New Madrid Earthquakes

California

Mag 7.9/8.0, 1811/1812; largest U.S. EQ outside of Alaska (together with 1857 Fort Tejon)



Earthquakes recorded between 1974 and 1995



Fig. 6.35

Fig. 5.12 Earthquake Intensities and Magnitudes

Mercalli Intensity

California

USGS Did-you-feel-it map



Earthquake Intensities and Magnitudes

Richter Magnitude Scale M_L

- introduced by Charles Richter (1935)
- most widely used (e.g. media)
- no upper limit
- instrument-based (maximum swing in seismogram)
- measures shaking rather than damage
- logarithmic: each step = ten-fold increase in shaking

Earthquake Intensities and Magnitudes

Richter Magnitude Scale M_L



- only good out to 500km
- depends on regional geology
- underestimates large EQs

Earthquake Intensities and Magnitudes

Moment Magnitude Scale

- introduced by Hiroo Kanamori
- no upper limit
- instrument-based (whole seismogram)
- measures released energy (seismic moment M_0 ; Nm)
 - logarithmic: each step = 30-fold increase in energy

 $M_W = 2/3 \log_{10}(M_0) - 6$

1960 Concep