

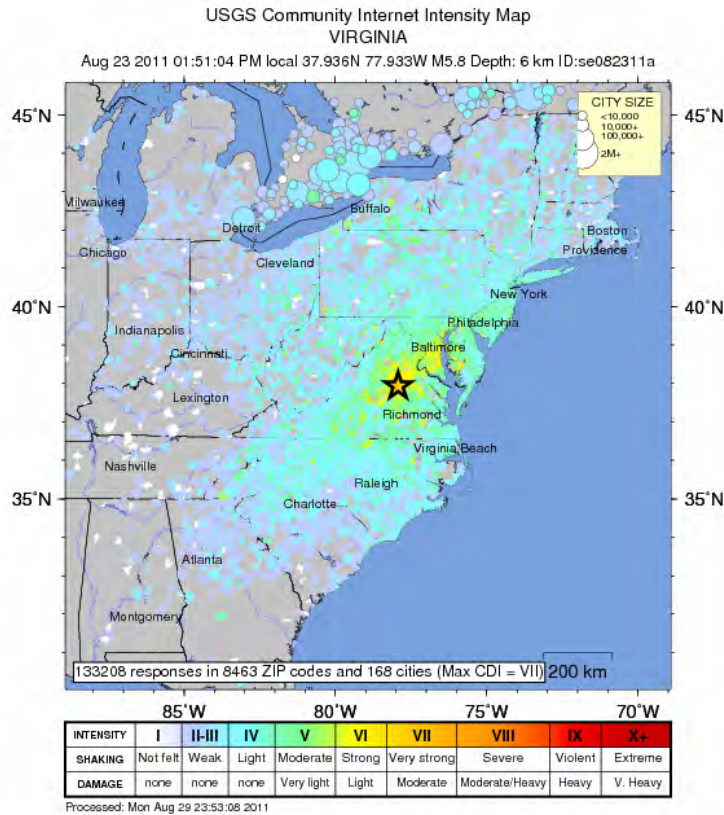
# Shaking from Induced Earthquakes

Susan Hough

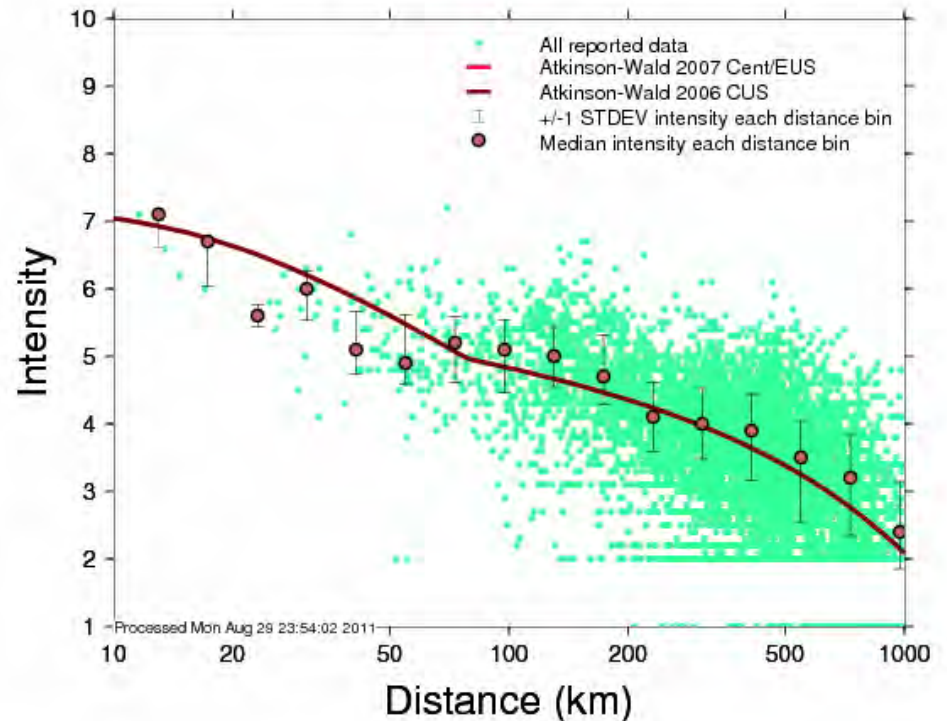
USGS, Pasadena, CA

[hough@usgs.gov](mailto:hough@usgs.gov)

# Shaking Intensity: “Did You Feel It?” Data



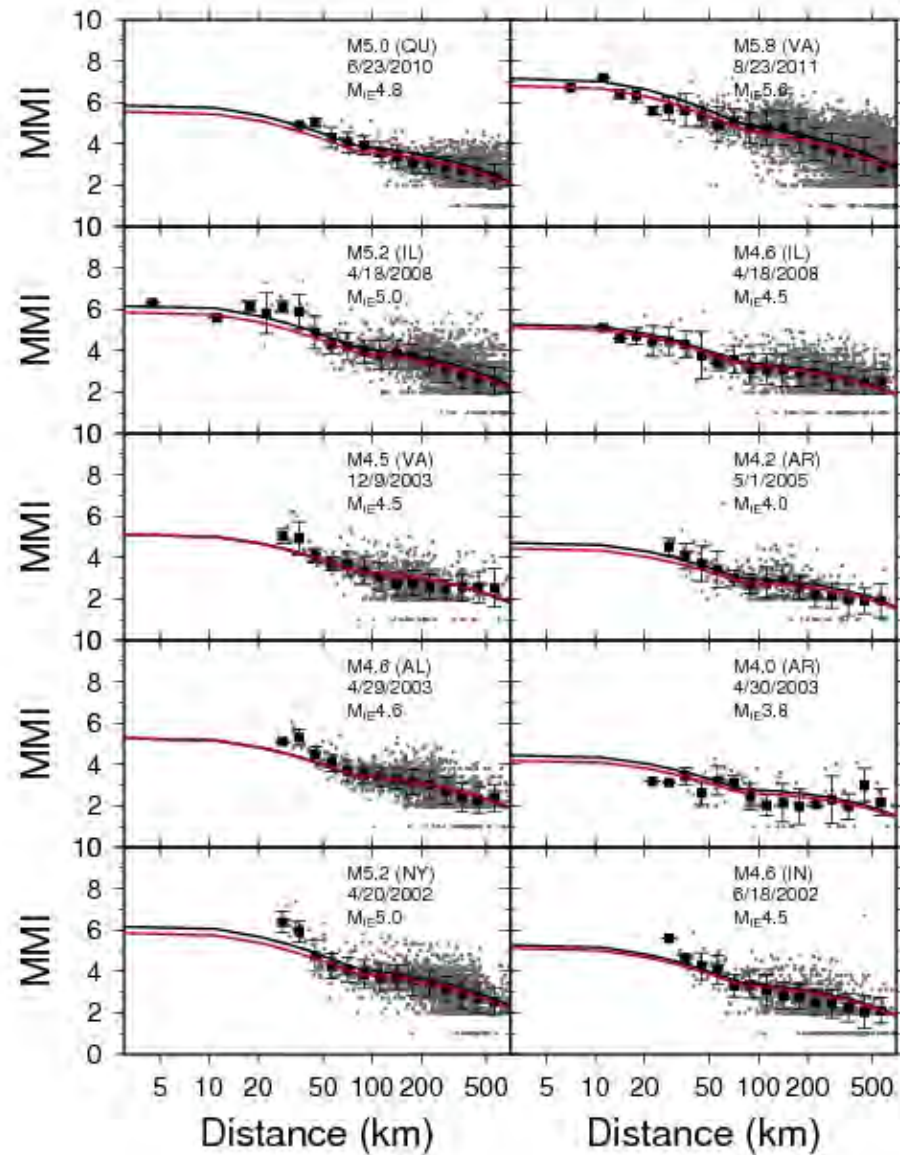
Distance vs. Intensity Plot (ID se082311a)



Intensity-prediction equation (Atkinson and Wald, 2007):

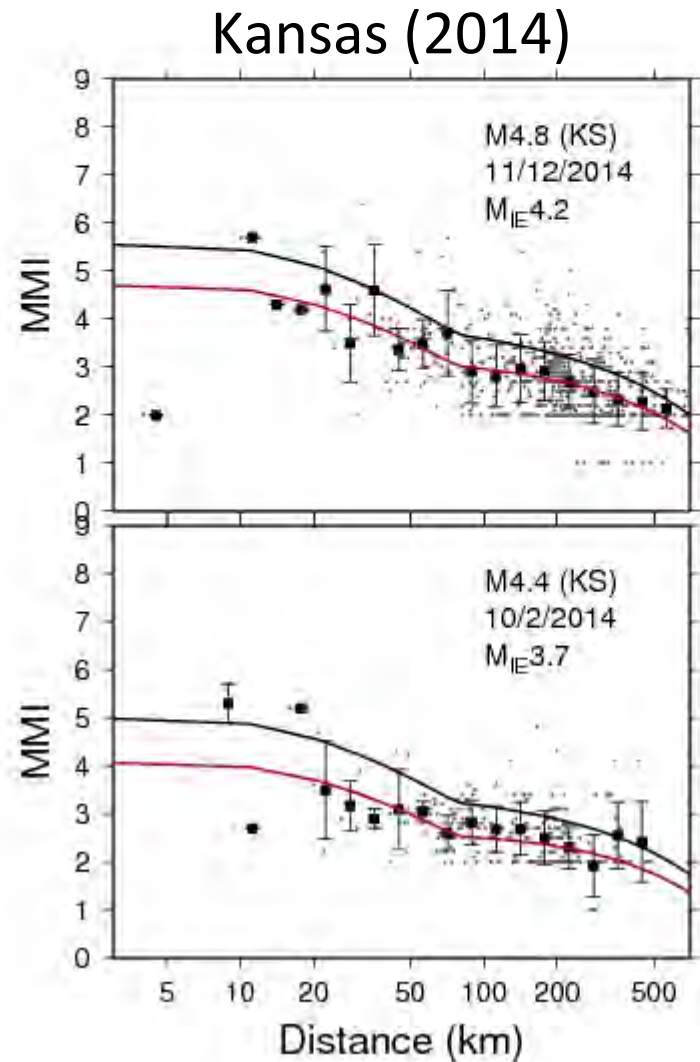
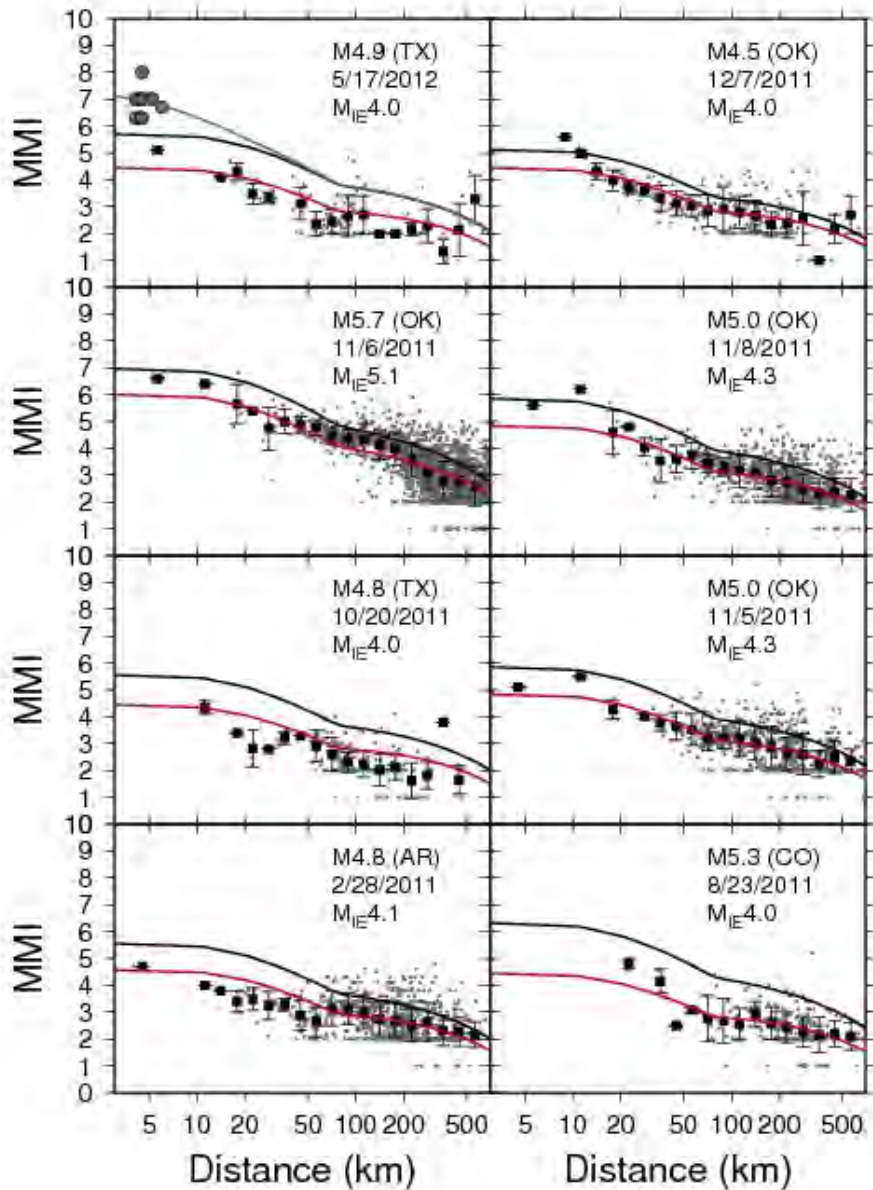
$$CDI(M,R) = d_1 + d_2(M-6) + d_3(M-6)^2 + d_4 \log(R) + d_5 R + d_6 B + d_7 M \log(R)$$

# Recent CEUS Tectonic Earthquakes



# Induced Earthquakes

Lower shaking observed for induced earthquakes.



# Interpretation

- Relatively high near-field intensities  
Depth effect
- Low intensities > 10 km:  
Source (low stress drop) effect
- Ground motions >10 km  
“Effective intensity magnitude” =  $(M_w - 0.8)$

## References

Hough, BSSA, 2014

Hanks and Johnston, BSSA, 1992