Sensitivity of seismic hazard from individual GMPEs, CEUS

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NSHMP Ground-motion workshop

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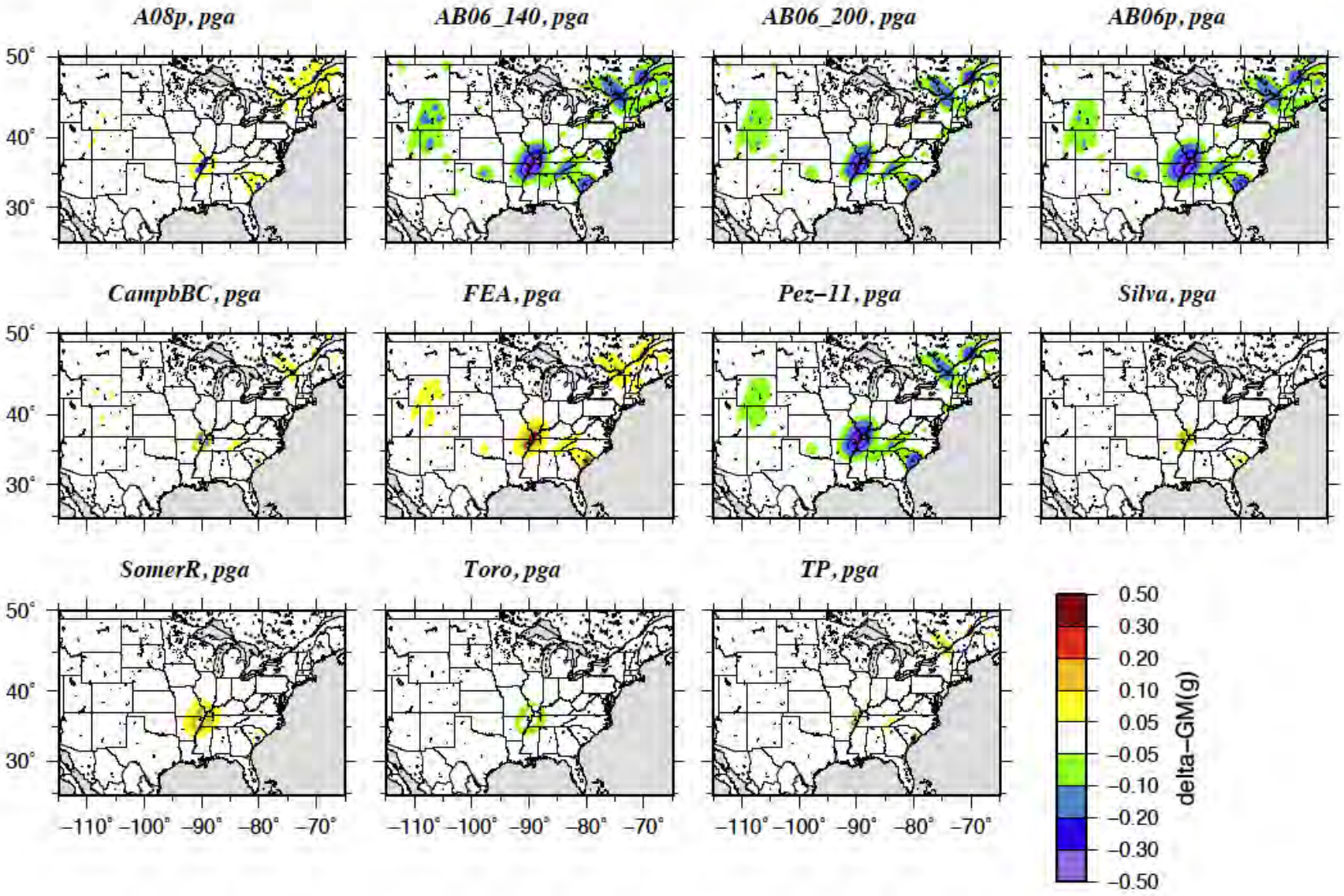
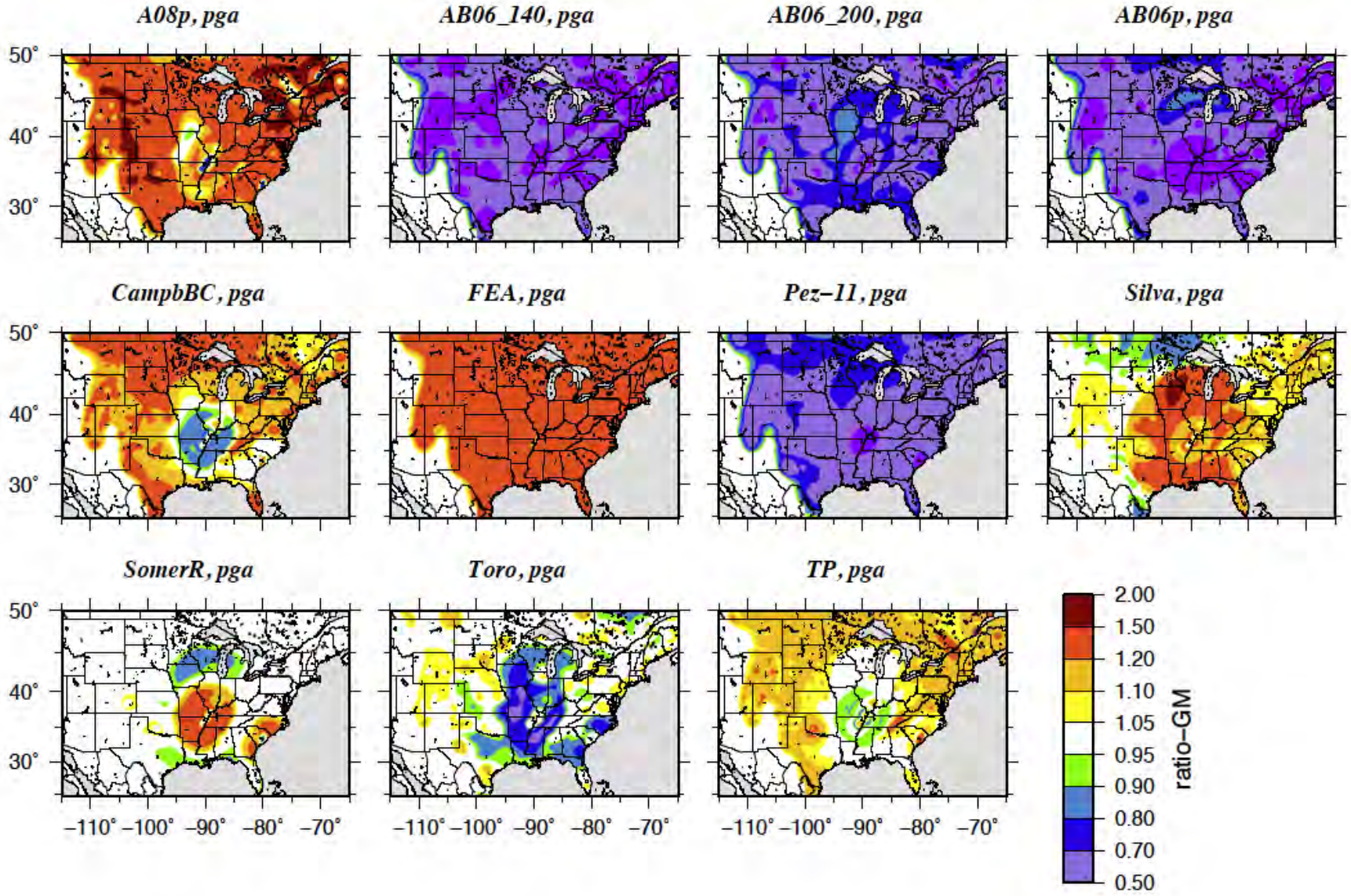
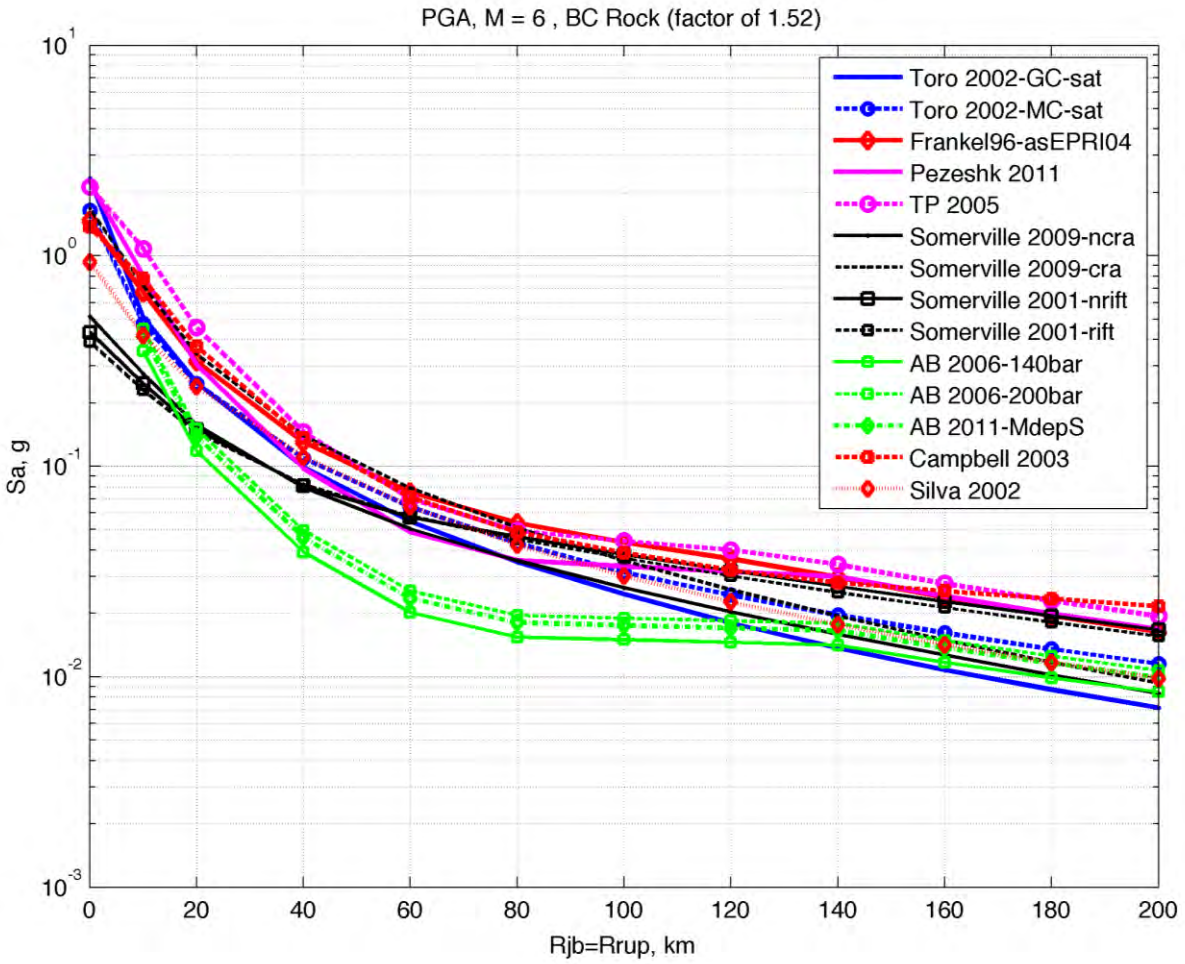
Hazard differences, PGA



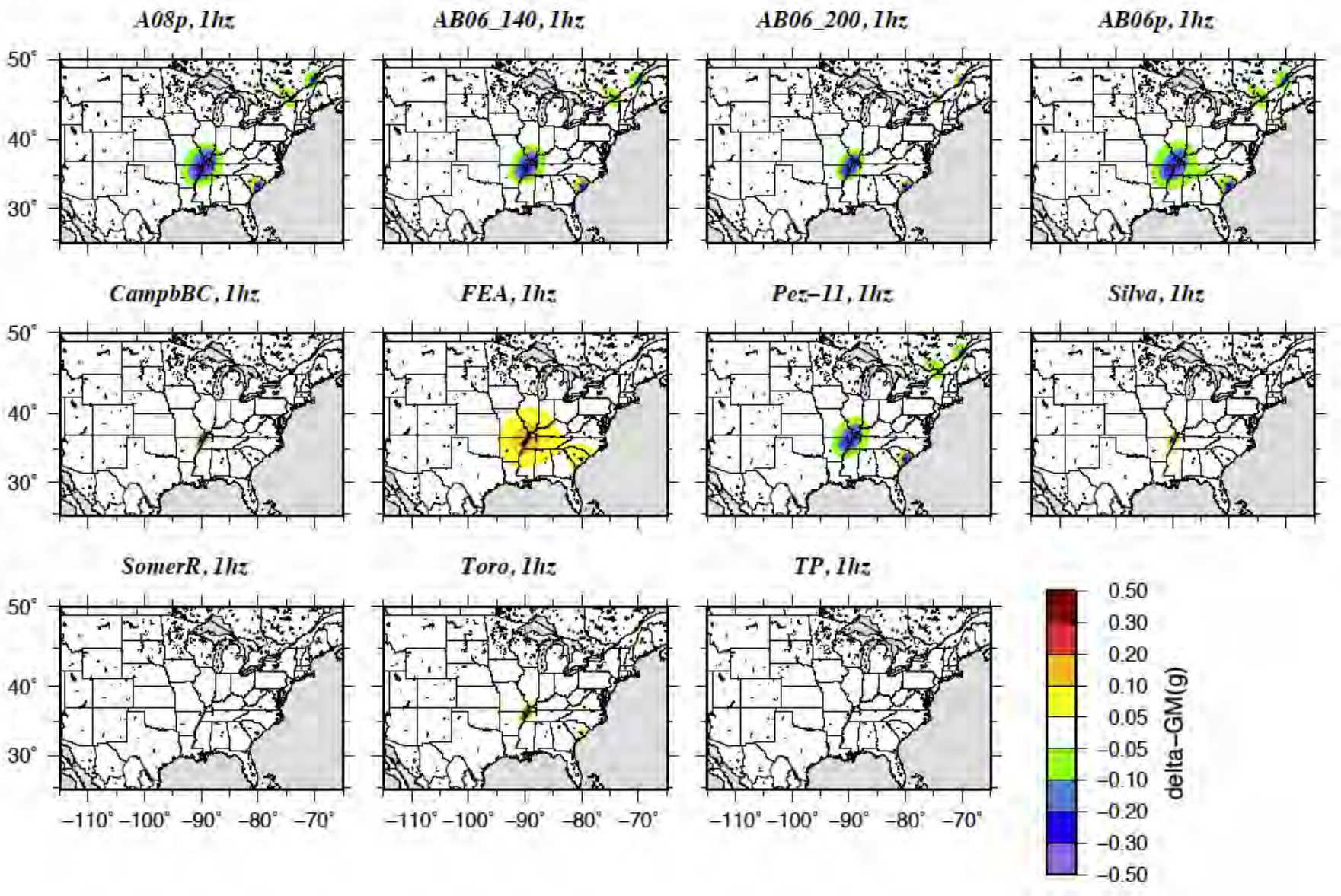
Hazard ratios, PGA



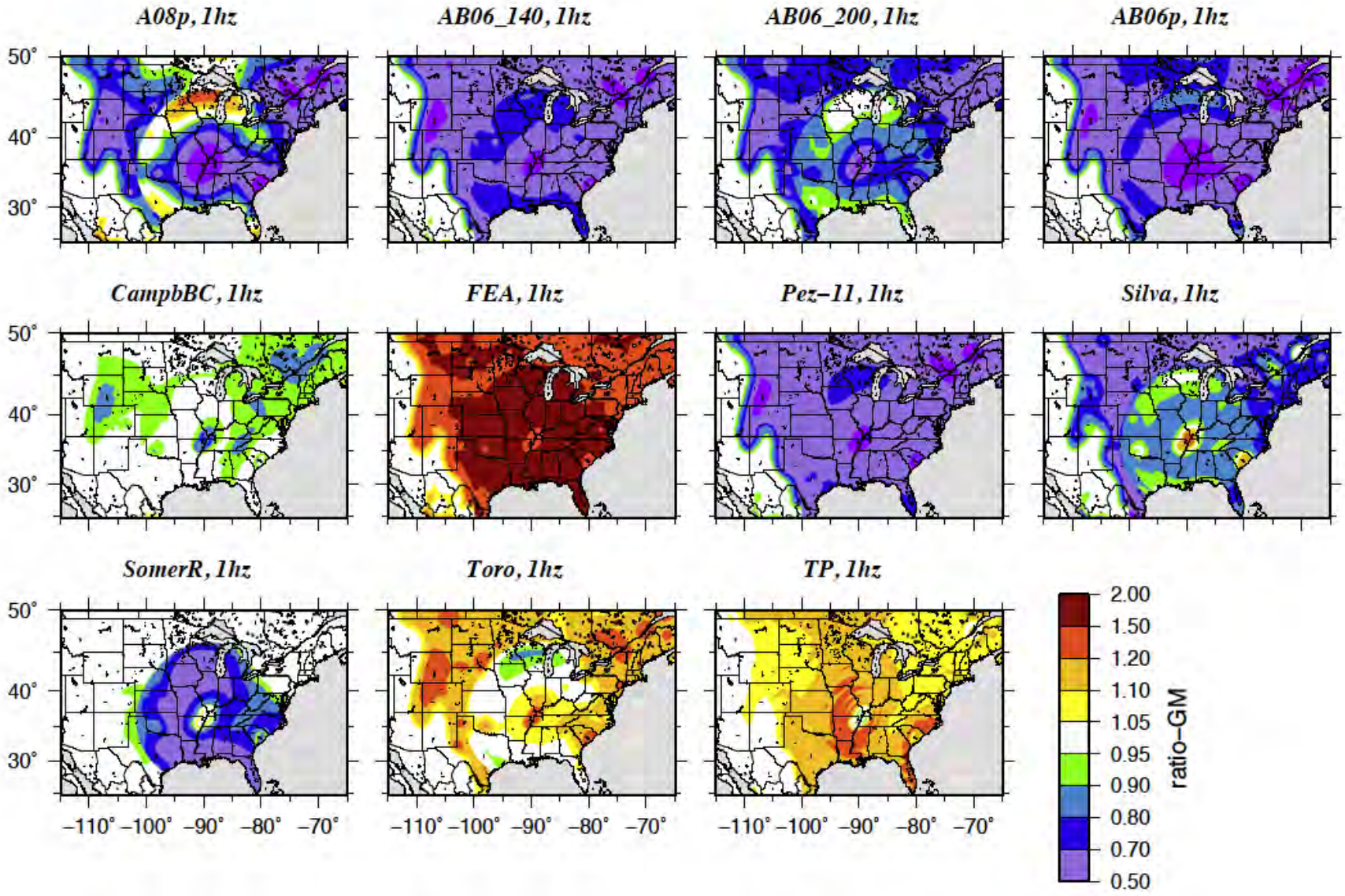
Sensitivity of individual GMPEs, PGA



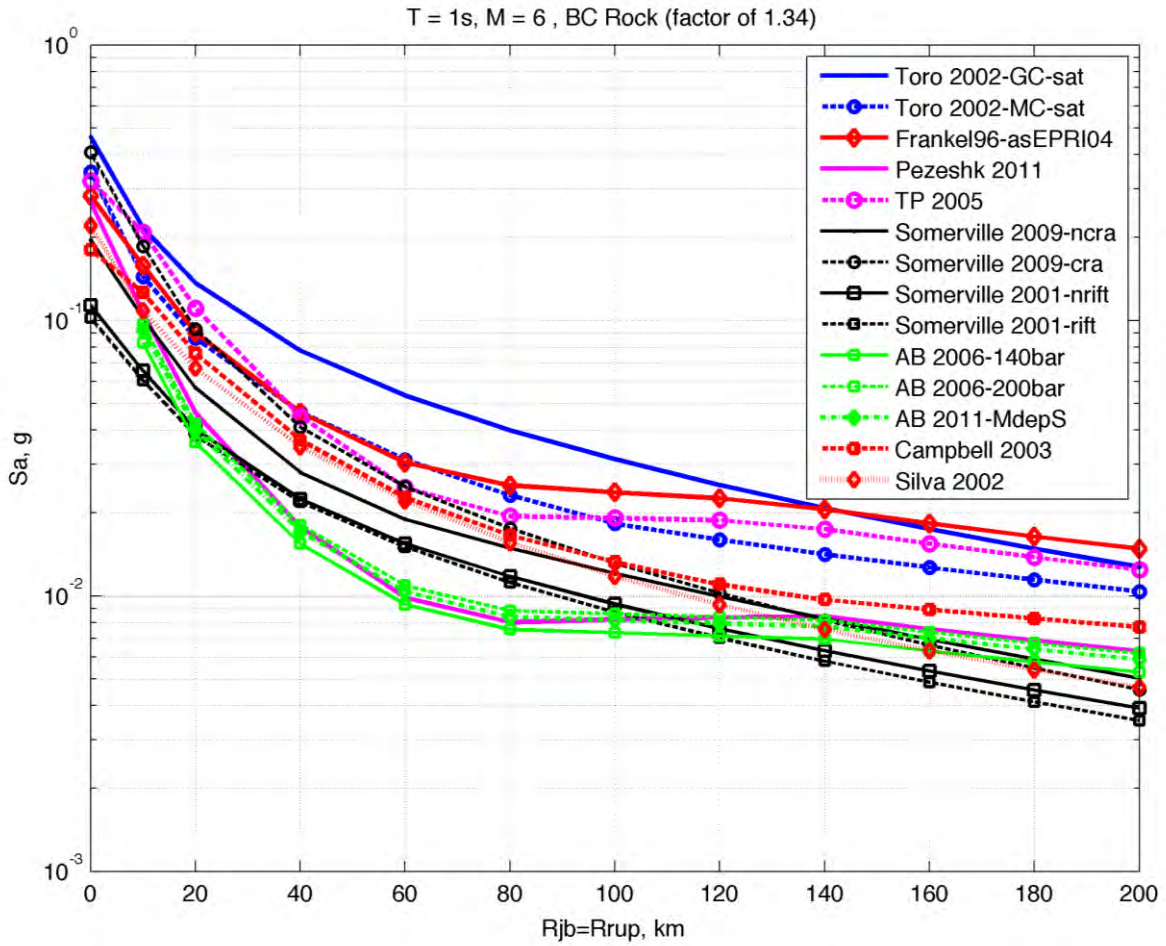
Hazard differences, 1 s



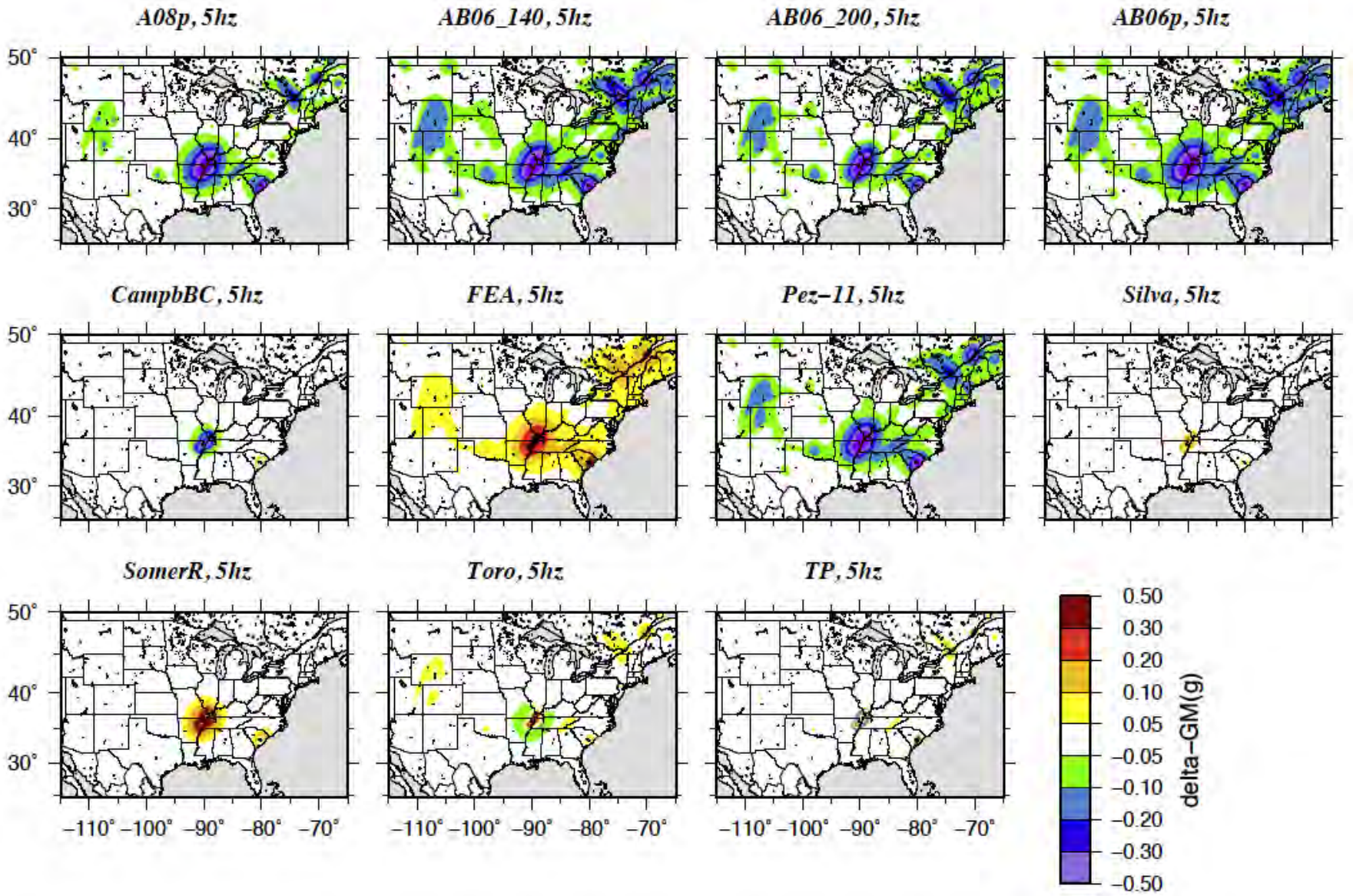
Hazard ratios, 1 s



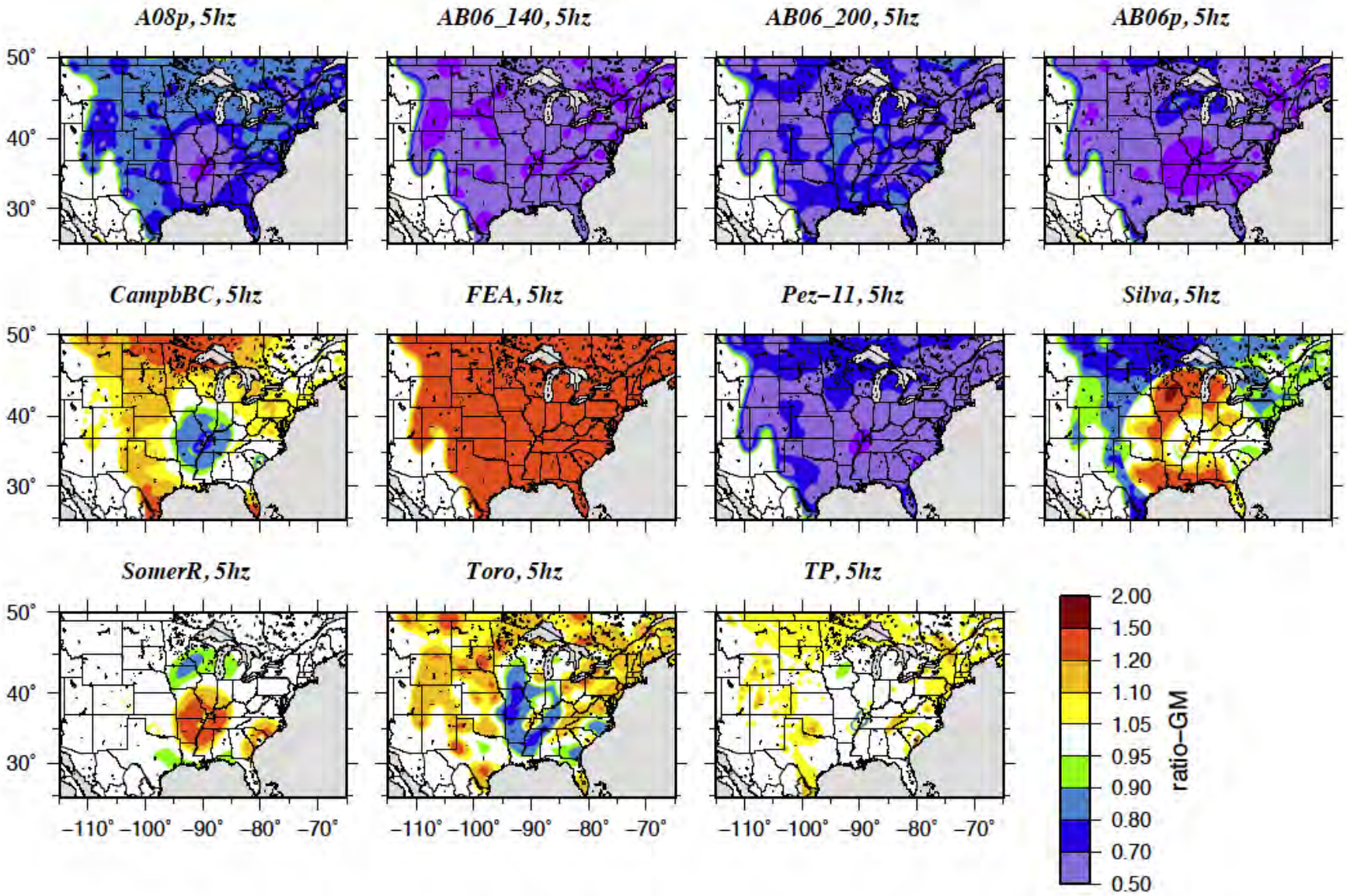
Sensitivity of individual GMPEs, 1 s



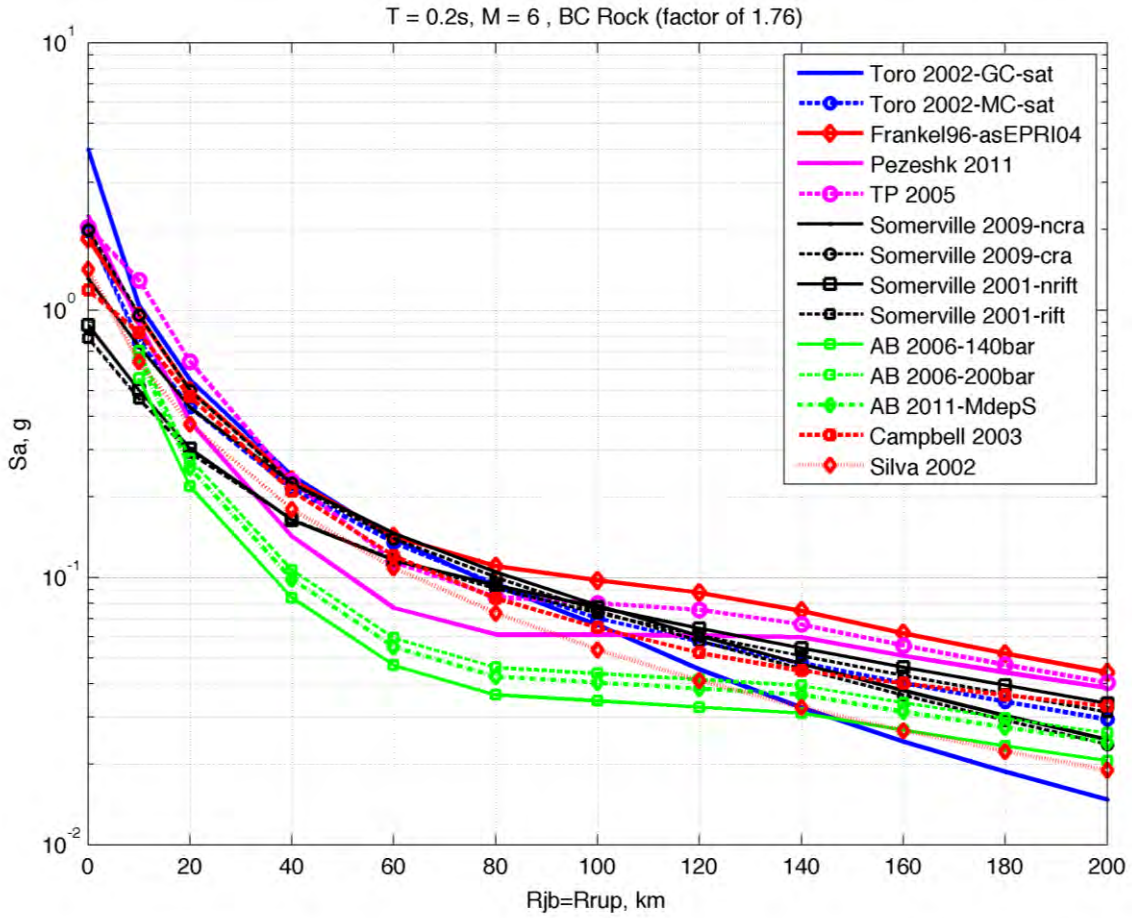
Hazard differences, 0.2 s



Hazard ratios, 0.2 s



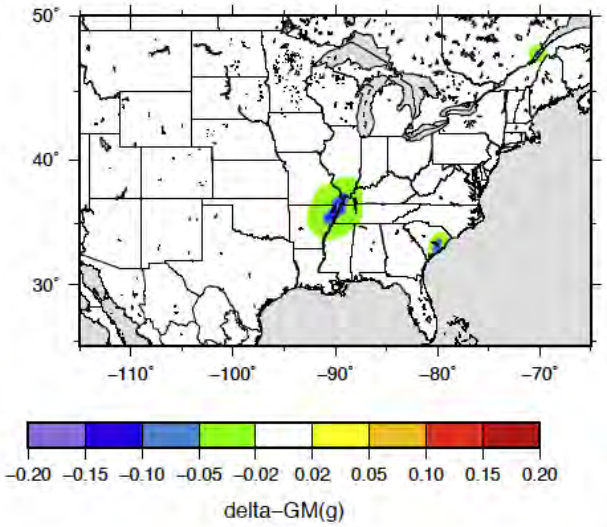
Sensitivity of individual GMPEs, 0.2 s



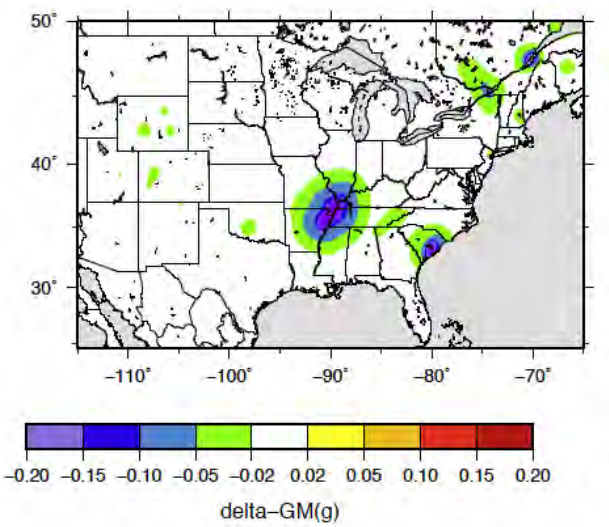
Potential weighting schemes for NSHM update

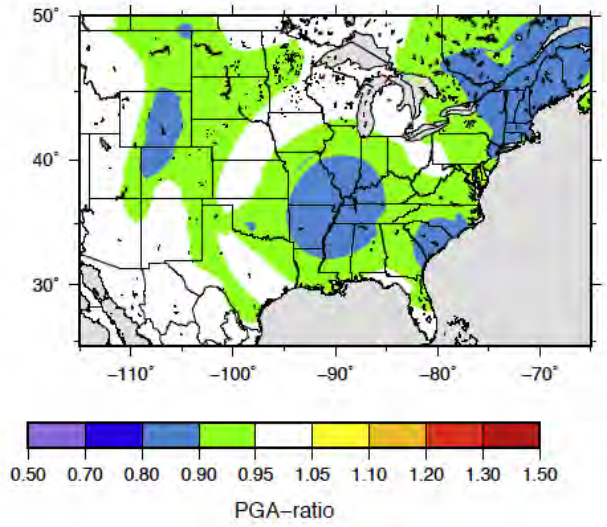
8 GMPEs, equal weight

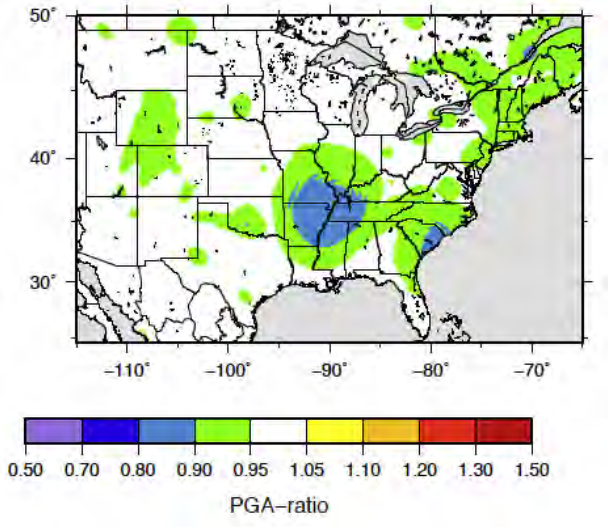
1 Hz



5 Hz

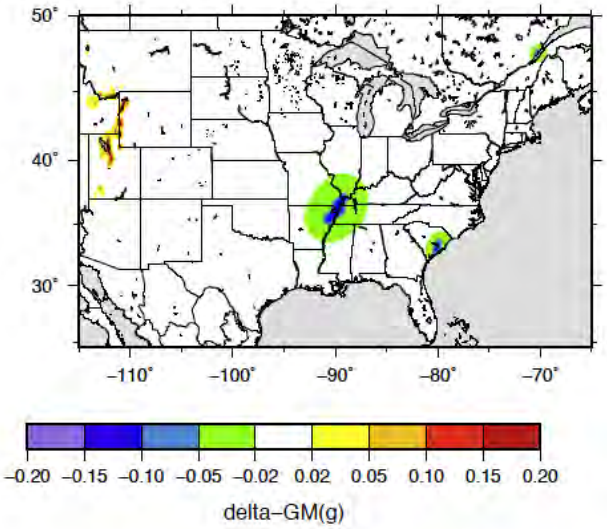




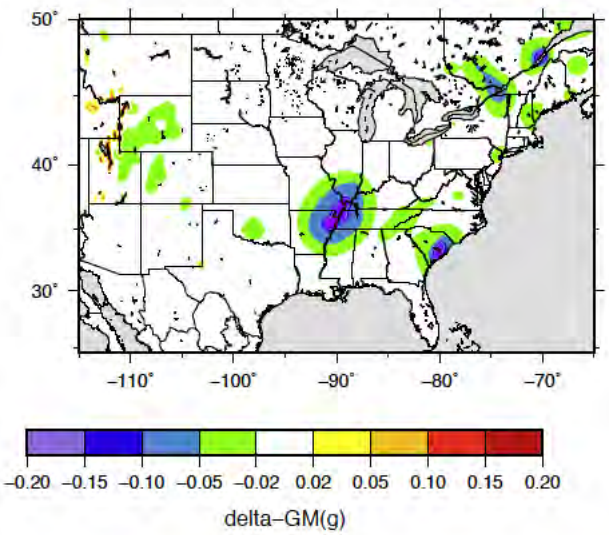


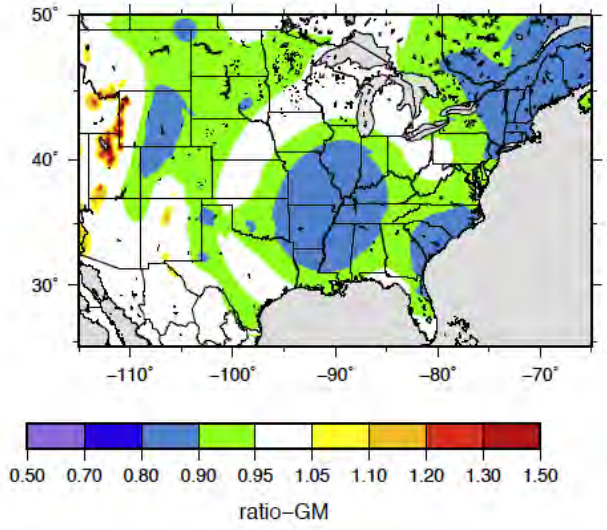
7 GMPEs, equal weight

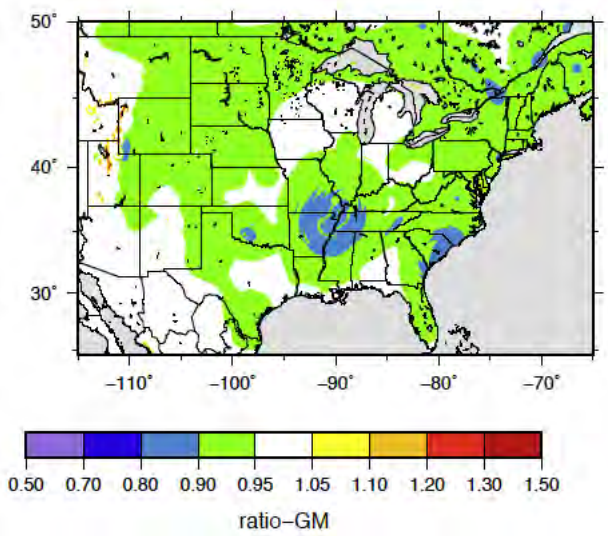
1 Hz



5 Hz

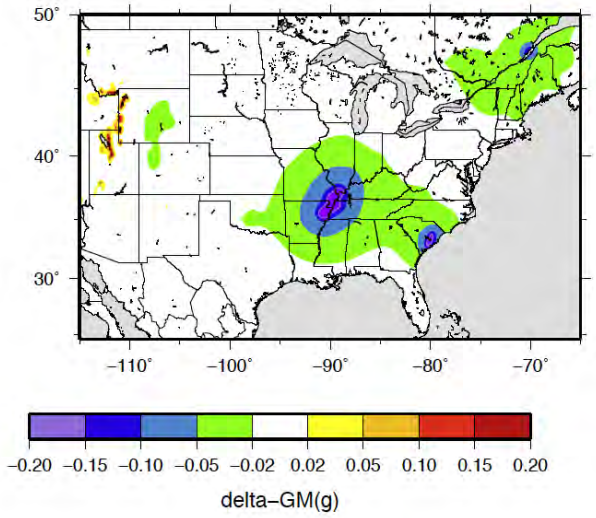




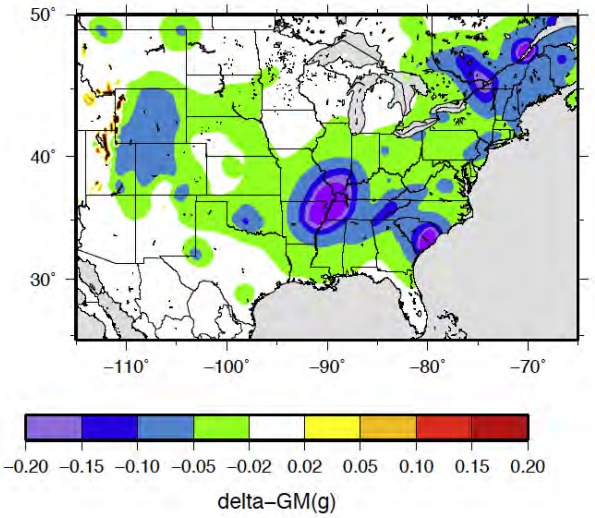


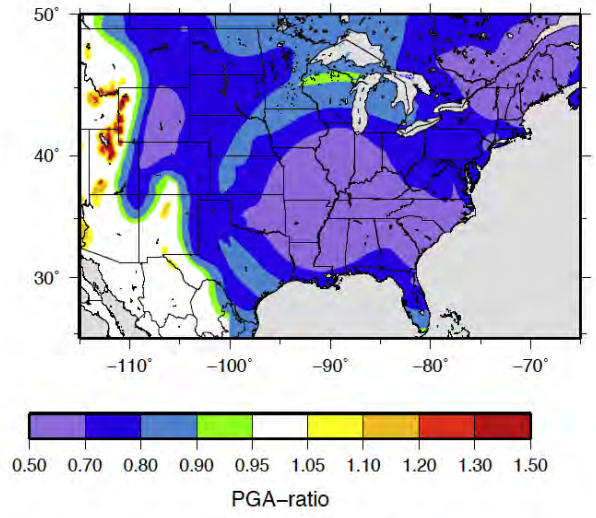
7 GMPEs, EPRI weighting

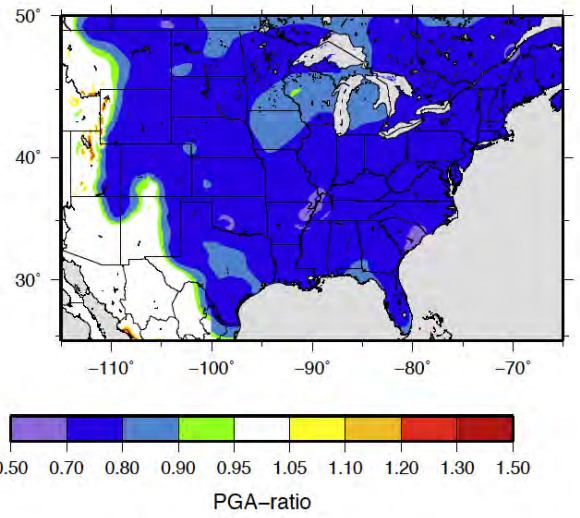
1 Hz



5 Hz

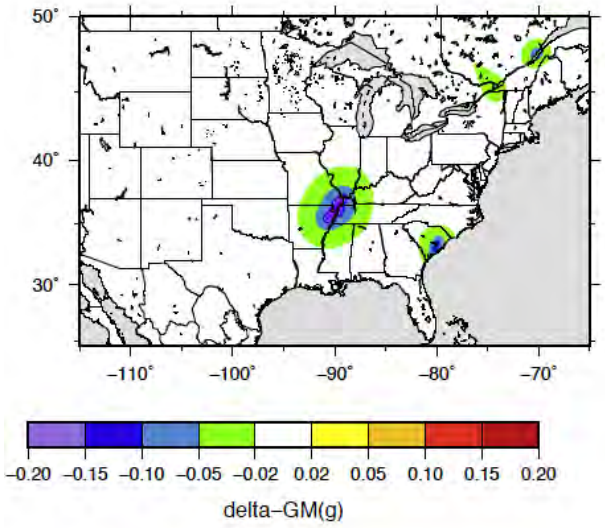


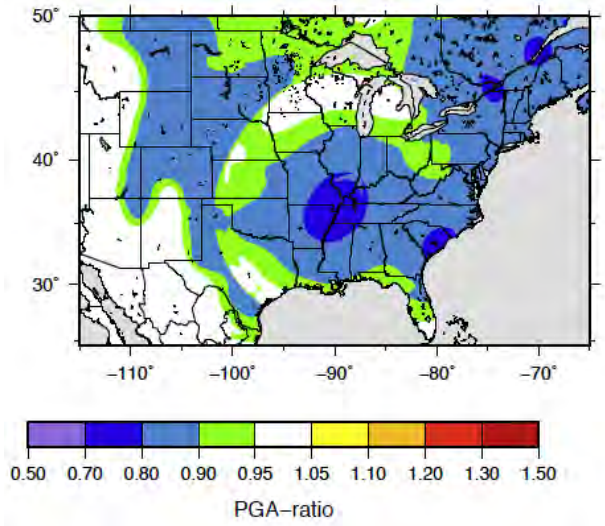




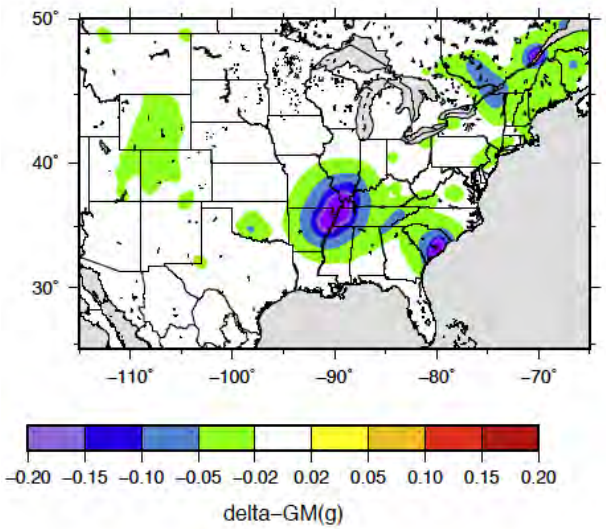
8 GMPEs, equal weight $r^{-1}/r^{-1.3}$

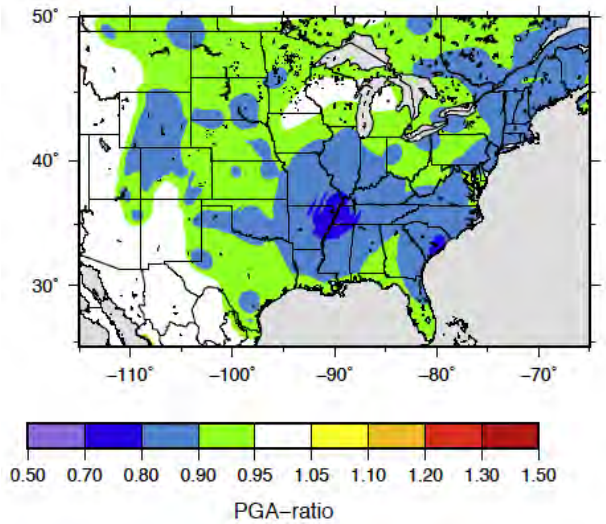
1 Hz





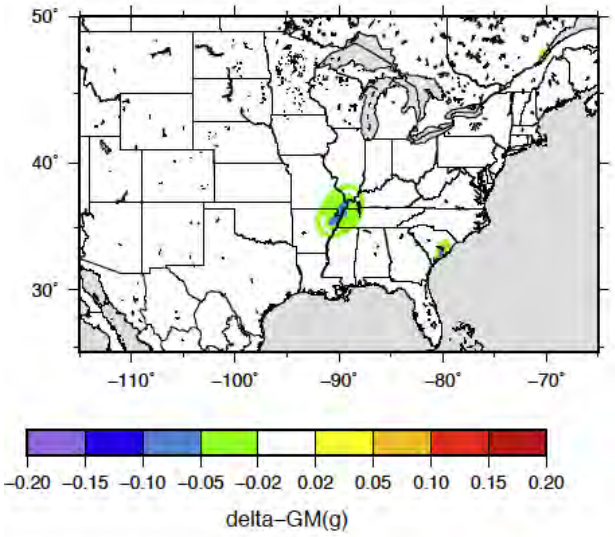
5 Hz



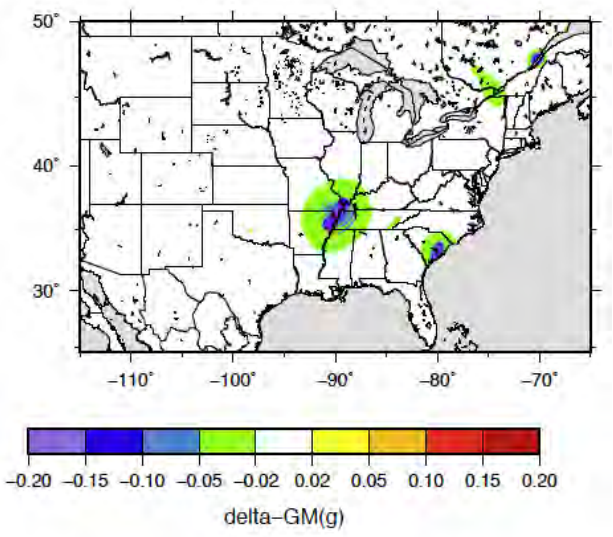


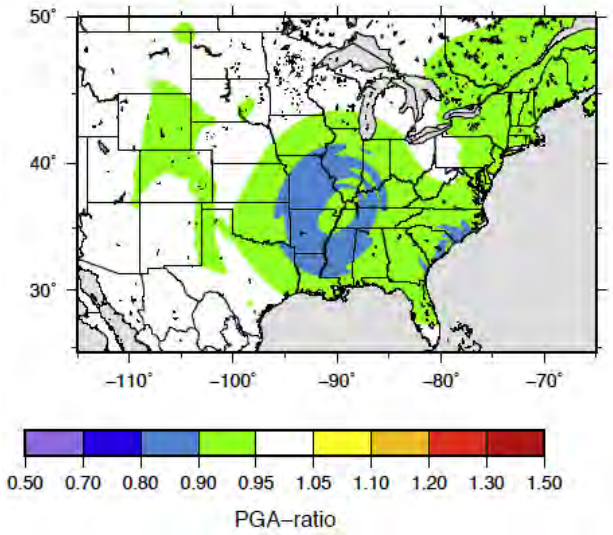
8 GMPEs, mimic NSHM-08 weights

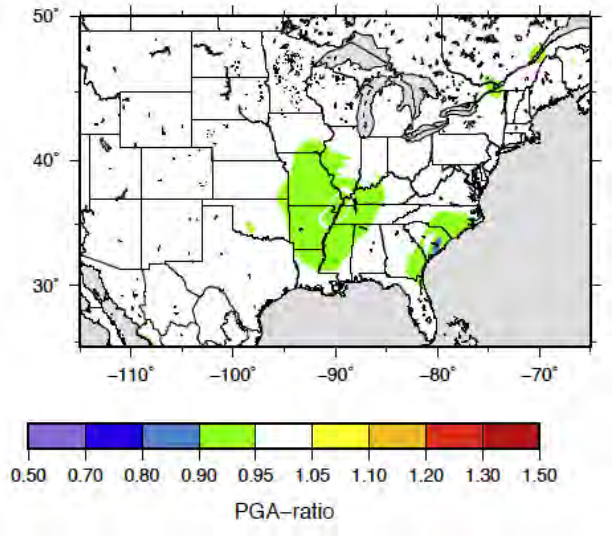
1 Hz



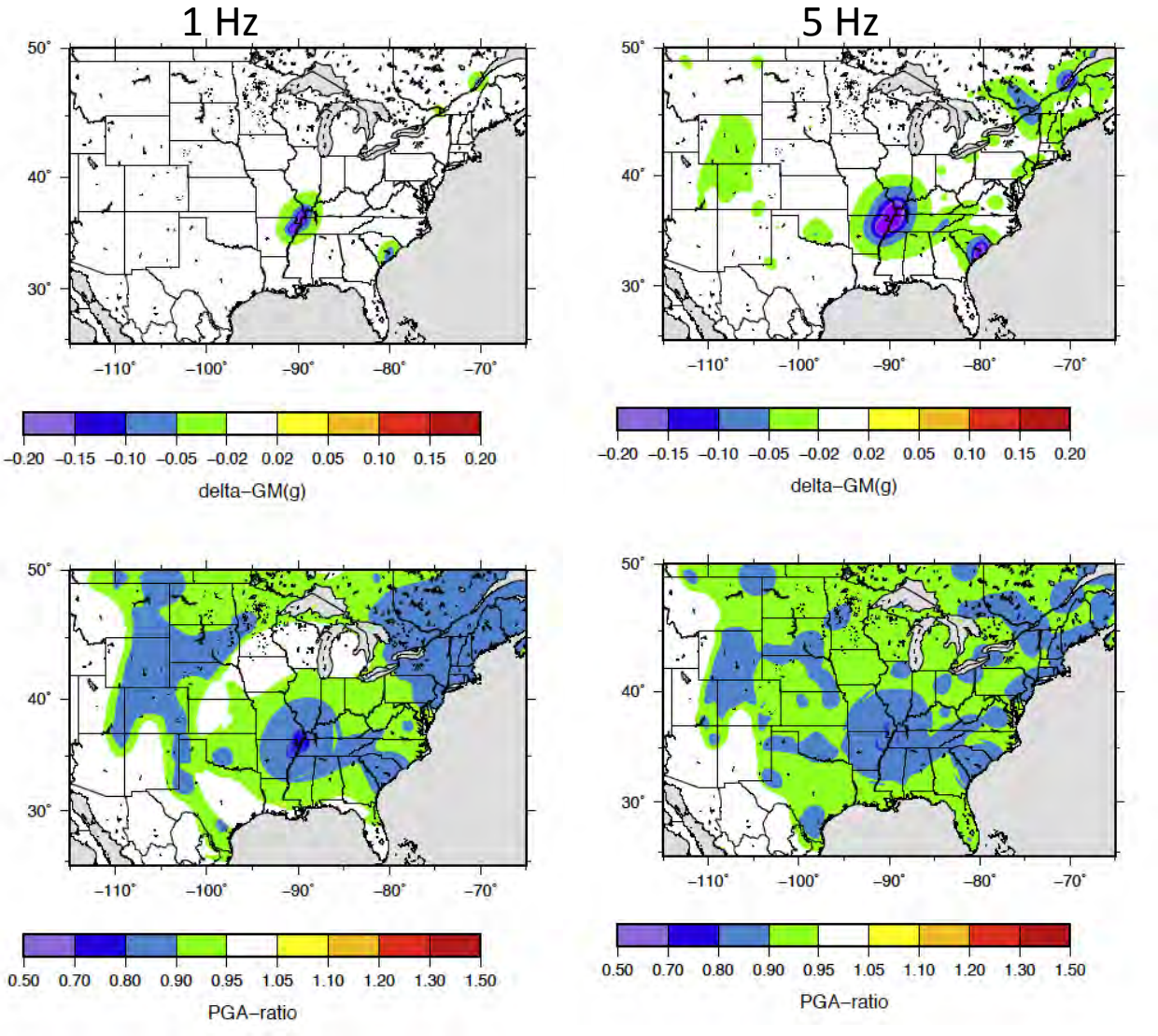
5 Hz







11 GMPEs, equal weight



Effects kappa on seismic hazard maps, CEUS

Morgan Moschetti

NSHMP Ground-motion workshop

December 12, 2012

kappa affects high-frequency shape amplitude spectrum

$$a(f) = A_0 \exp(-\pi \kappa f) \quad \text{for } f > f_E,$$

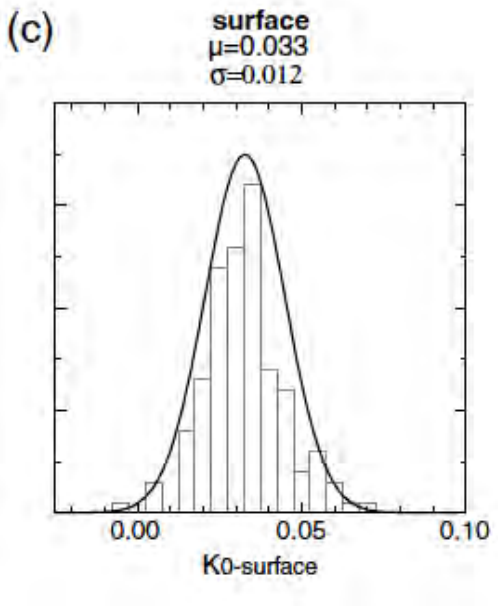
from Houtte et al. (2011)

- Anderson and Hough (1984) proposed shape of amplitude spectrum at high frequencies exponentially decay
- Amplitude is function of source and propagation path dependent amplitude term (Ao) and kappa term
- Above f_E, log(a(f)) decays linearly with frequency, f

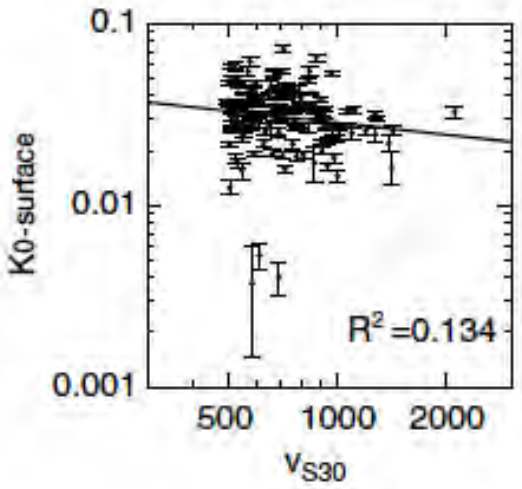
Features of kappa

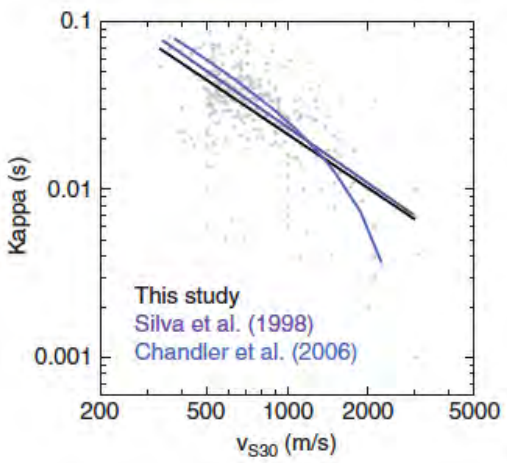
- Mechanism causing kappa observable is debated:
  - Site effect in near-surface
  - Source-dependent effect (e.g., fault nonelasticity)
- kappa increases with epicentral distance, consistent with anelastic attenuation
- Extrapolate kappa to r=0 to get κ_0 value
- Silva and Darragh (1995) values 0.008 ENA, 0.03[illegible] $\exp\left(-\frac{\pi r f}{Q v_S}\right)$ WNA.

Estimates of kappa from KiK-net



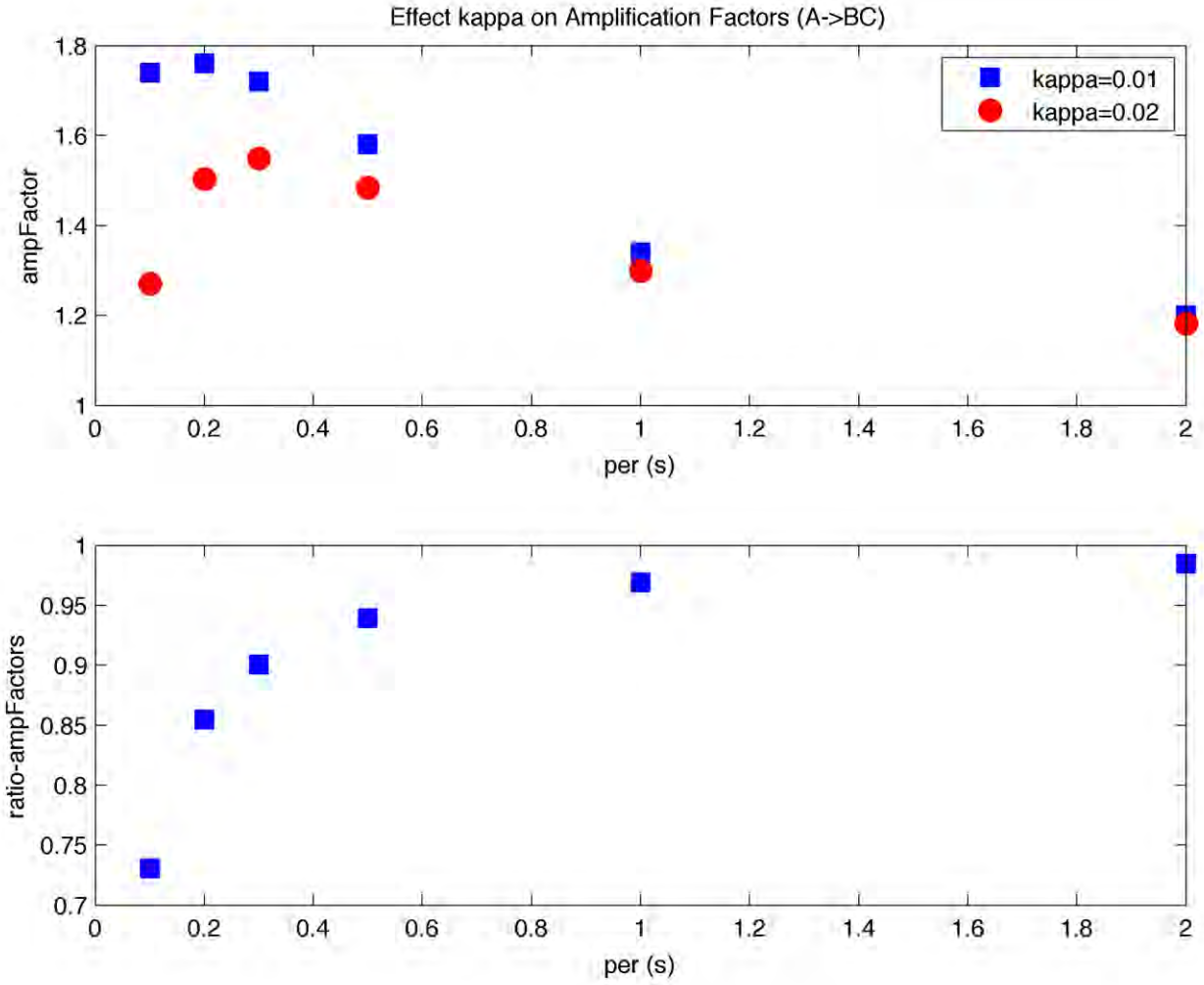
from Houtte et al. (2011)



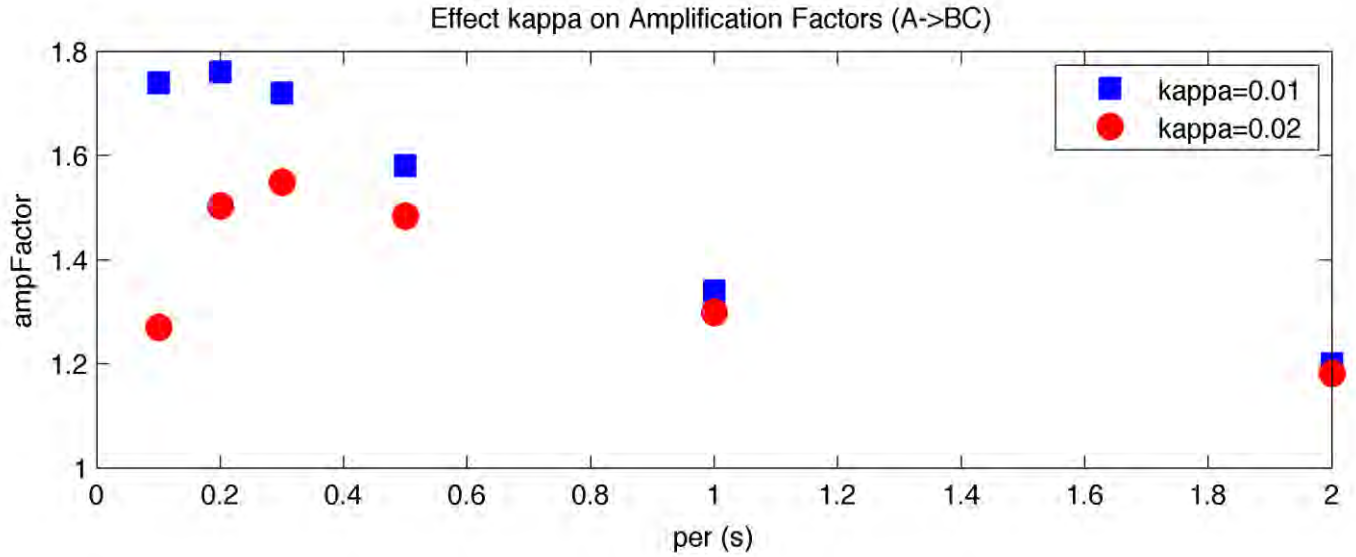


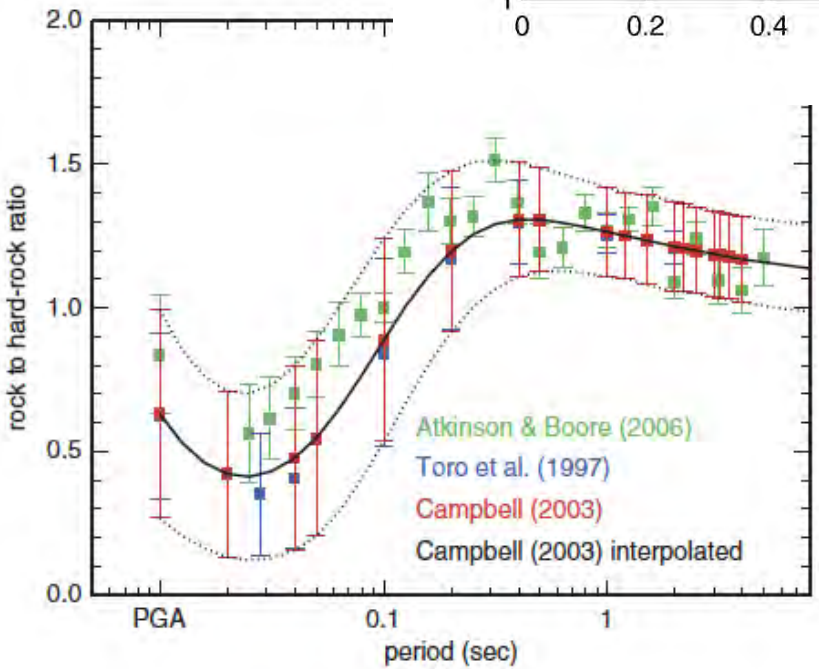
- Surface kappa: mean=0.033, uncertainty=0.012

2008-NSHM amplification factors



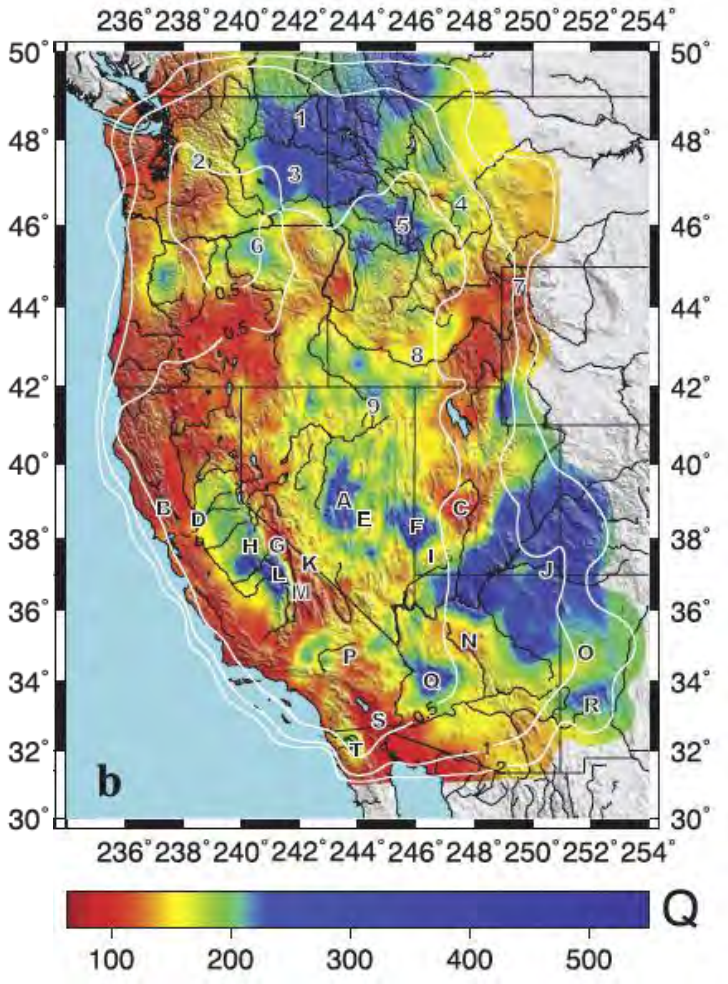
2008-NSHM amplification factors





ADDITIONAL SLIDES

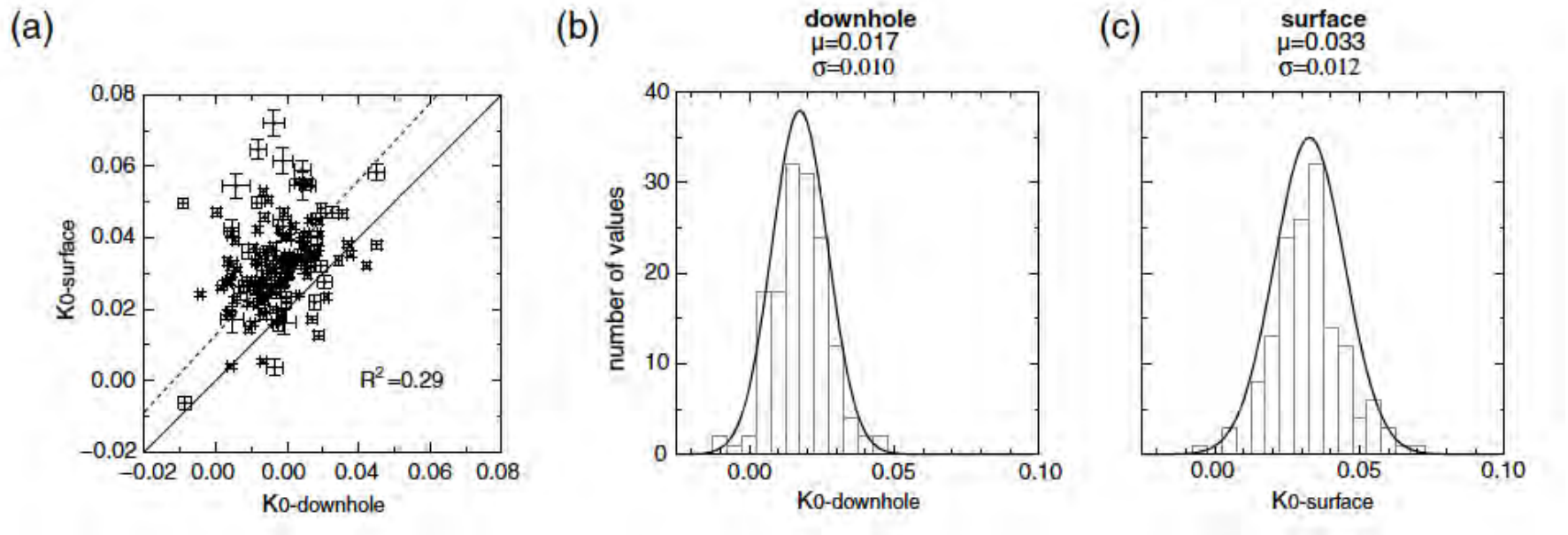
Forearc/backarc boundary in WUS



Phillips and Stead (2008)

- Forearc/backarc boundary in sensitivity studies put at Cascade arc
- LgQ attenuation shows high attenuation extending east of Cascades

Estimates of kappa from Kik-net



from Houtte et al. (2011)

- Downhole kappa ~0.017; surface ~ 0.033