

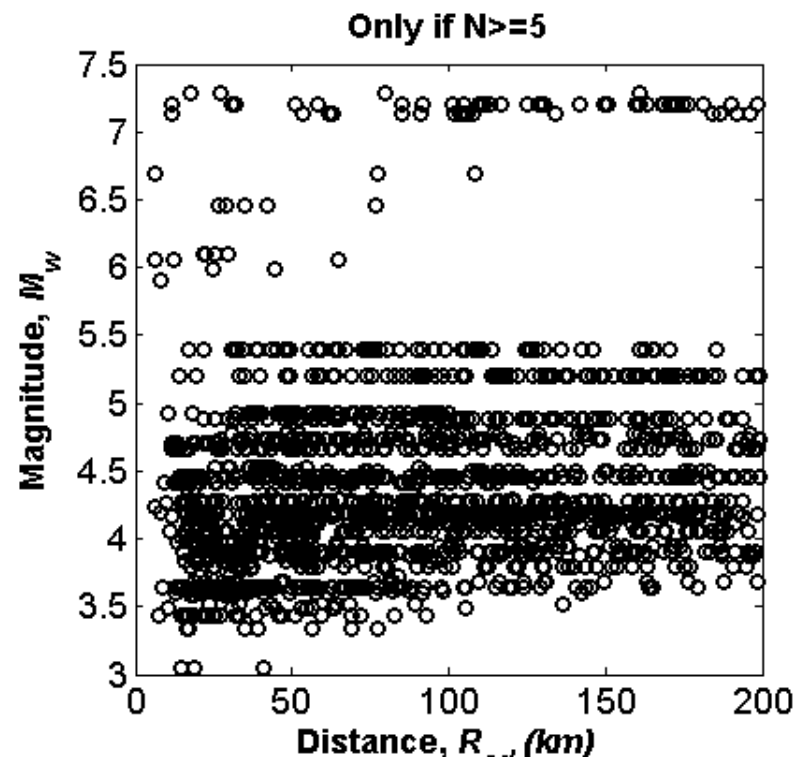
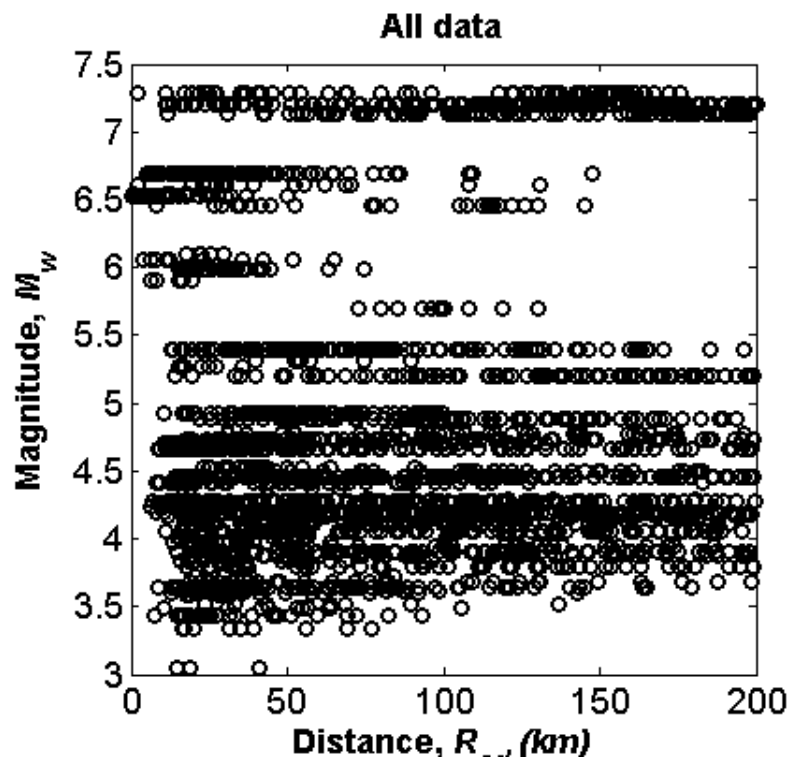
Validation and Use of 3-D simulations

- Before implementing the 3-D simulations into the building code, there should be a quantitative validation
 - Show that the 3-D simulations do better or no worse than GMPEs with basin depth terms
 - Use the current 3-D structure
- Approaches
 - Compare PSA
 - Example using cybershake1 (M. Villani)
 - Averaging –based factorization (F. Wang)
 - Compare FAS
 - Initial NGA-W2 empirical FAS models will be available July 2015

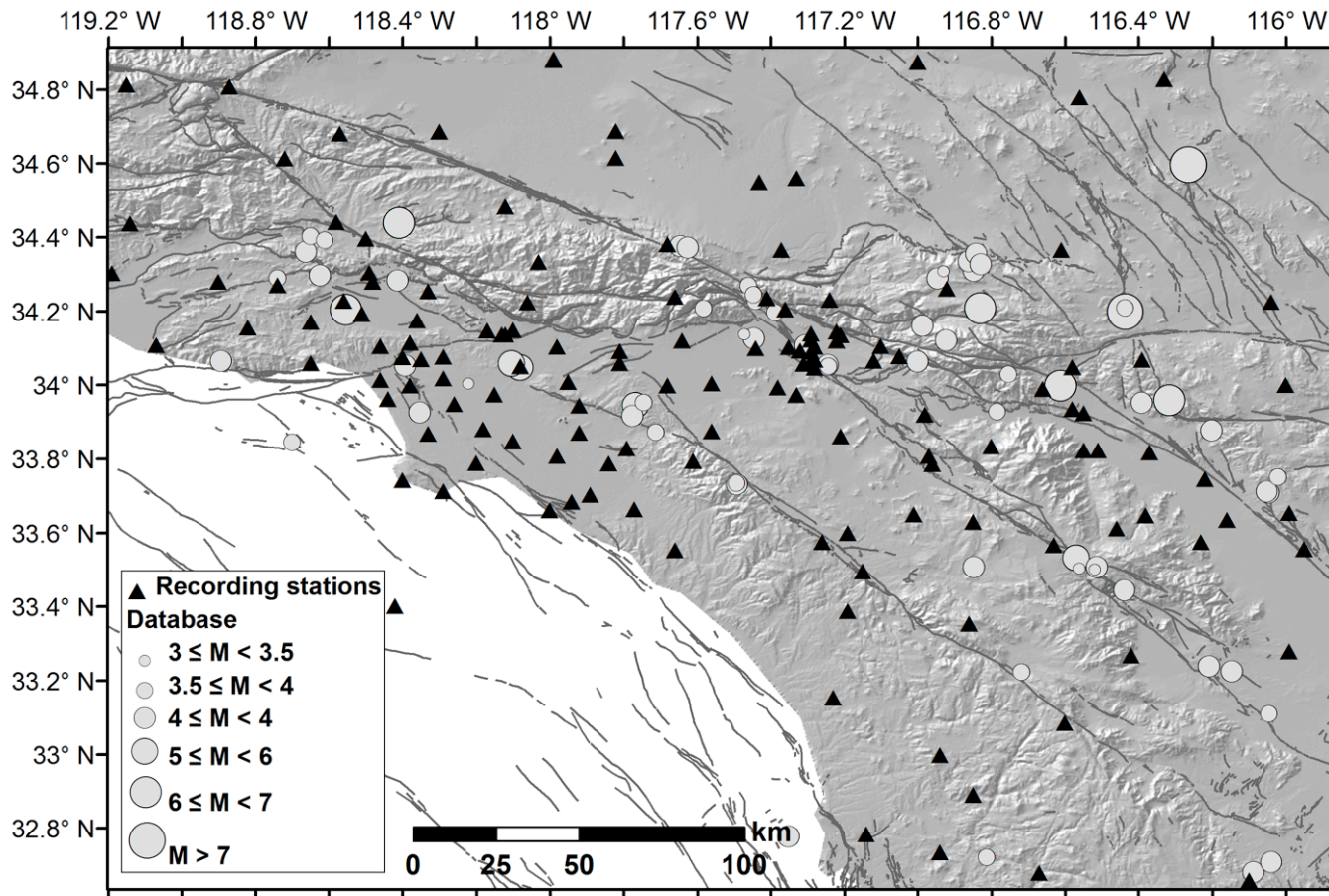
Villani (BSSA 2015)

- Data Sets
 - Use Cybershake1 results
 - Use NGA-w2 residuals I LA region
 - Mainly M3 – M5
- Limitations
 - Assumes $T=3$ sec residuals from small eqk capture linear path and site effects
 - Cybershake locations and NGA-W2 sites do not match
 - Used residuals from stations within 5 km of cybershake simulation sites

NGA-W2 Data Set for Southern CA

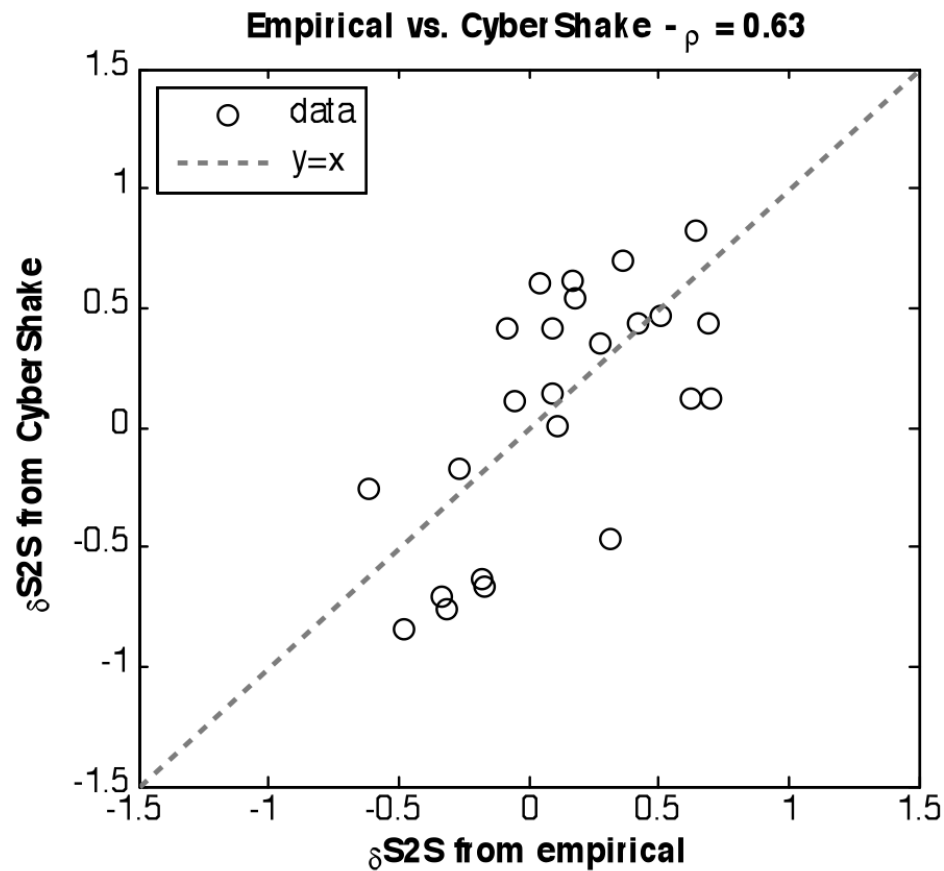


Empirical Data from NGA-west2 ($N \geq 5$ per station)

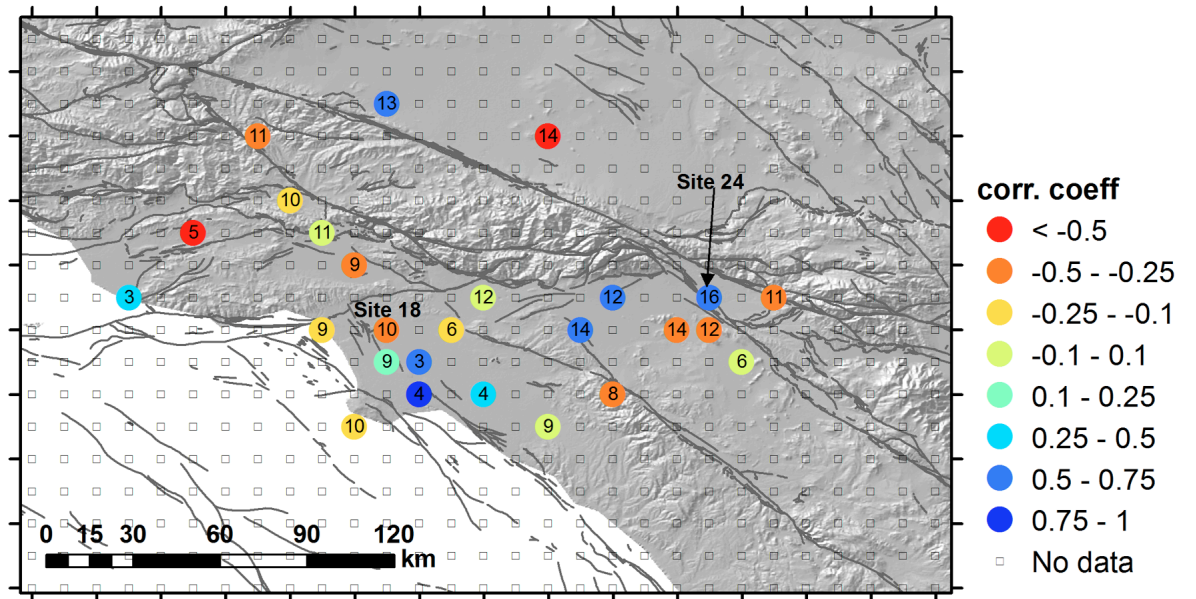
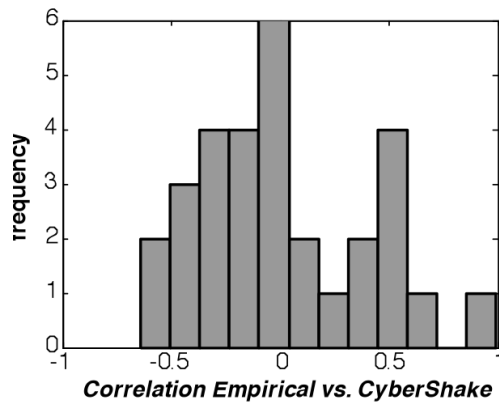
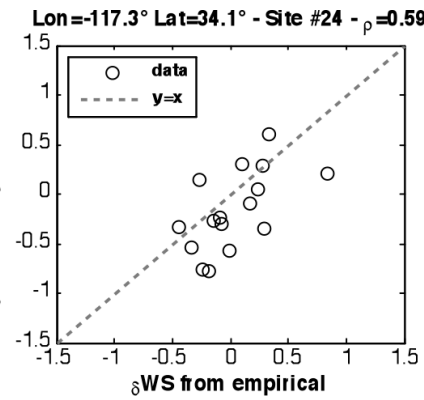
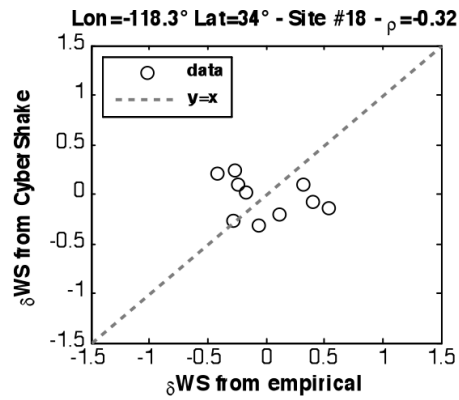


1776 Recordings
307 earthquakes

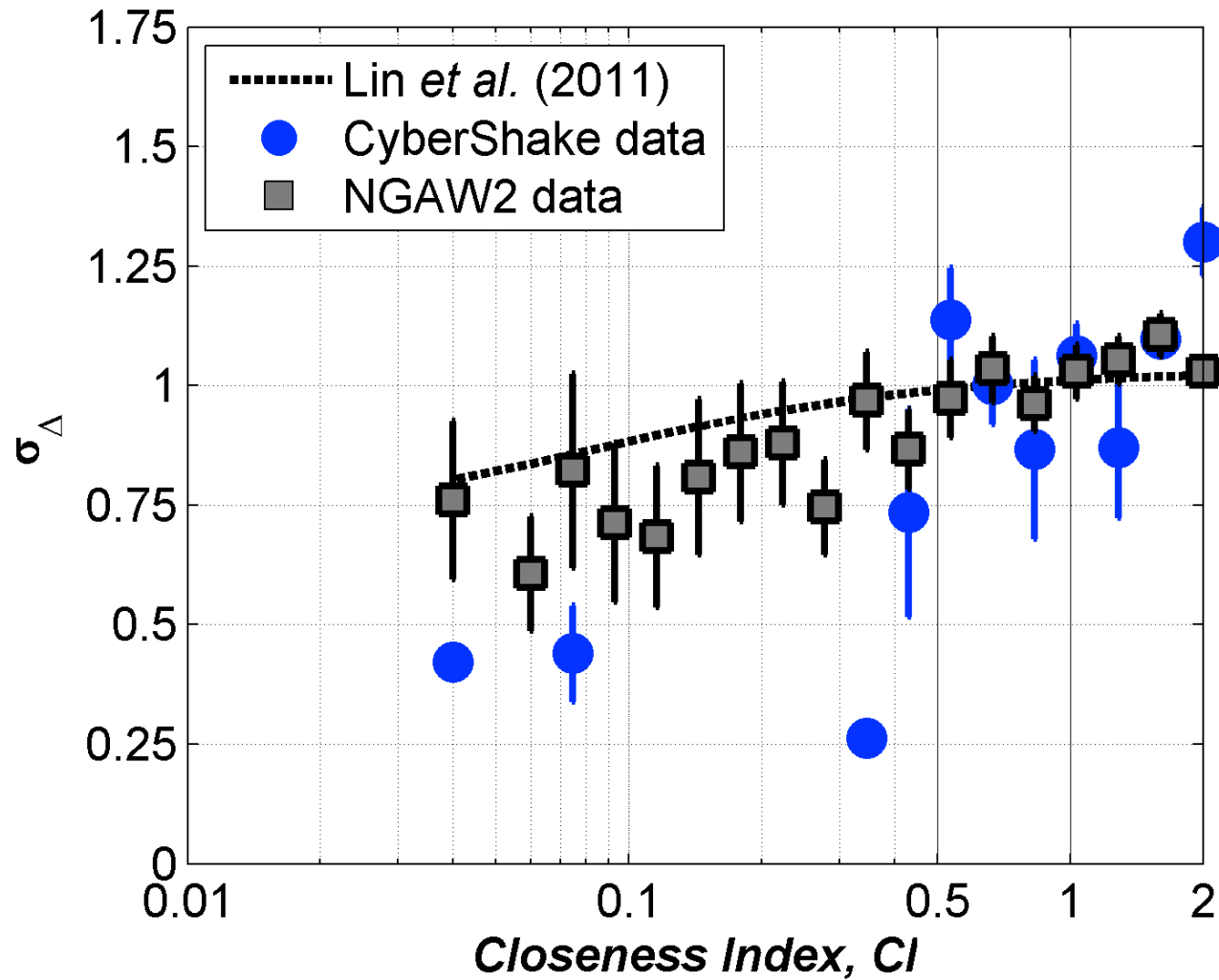
Correlation of Site Terms (T=3 sec) Cybershake and Empirical Data



Correlation of Path Effects Between CyberShake and Empirical



Repeatability of Path Effects



Moving Forward

- Could repeat Villani evaluation using new cybershake simulations
 - Easy to do
- Could use averaging-based factorization approach to compare GMPEs and 3-D simulations
 - Easy to do
- Could run 3-D simulations for the smaller earthquakes and compare FAS
 - 300 earthquakes
 - May require too much effort