

Hazard Sensitivity in CEUS to Phi and PhiSS

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Sigma and Single-Station Sigma

- Ergodic Sigma: $\sigma = \sqrt{\phi^2 + \tau^2} = \sqrt{\phi_{SS}^2 + \phi_{S2S}^2 + \tau^2}$
- Removing the systematic site effects leads to single-station Sigma:

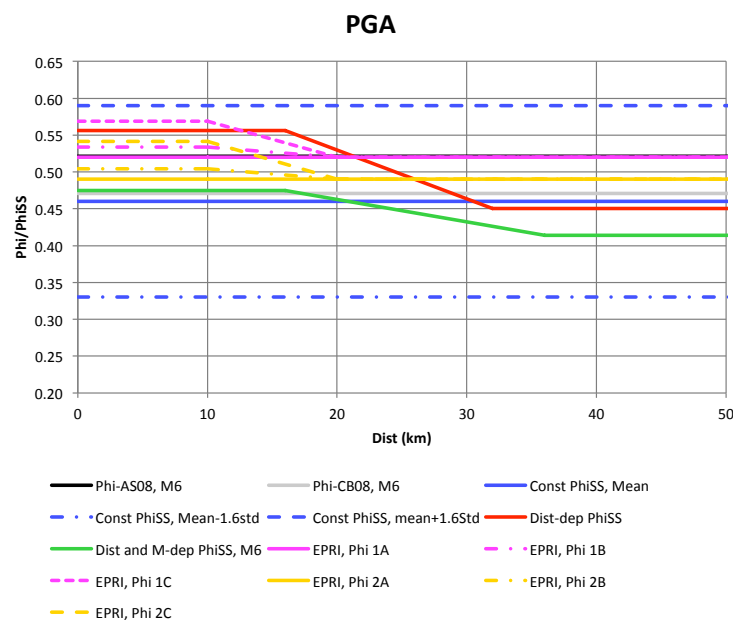
$$\sigma_{SS} = \sqrt{\phi_{SS}^2 + \tau^2}$$

Sigma Models

- **Tau:** EPRI (2006) CEUS model – WUS Tau applicable to CEUS
- **Phi/PhiSS:** A total of 13 models
 - PEGASOS constant PhiSS, mean values
 - PEGASOS constant PhiSS, mean – 1.6 std values
 - PEGASOS constant PhiSS, mean + 1.6 std values
 - PEGASOS distance-dependent PhiSS model
 - PEGASOS magnitude- and distance-dependent PhiSS model
 - AS08 Phi model (magnitude-dependent)
 - CB08 Phi model (constant)
 - 6 CEUS EPRI models for Phi based on WUS data

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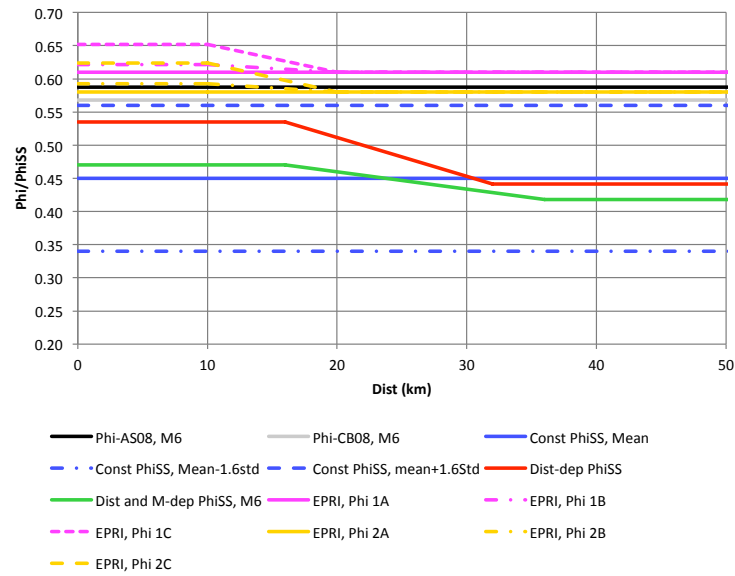
Comparison of Phi and PhiSS Models



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Comparison of Phi and PhiSS Models (cont'd)

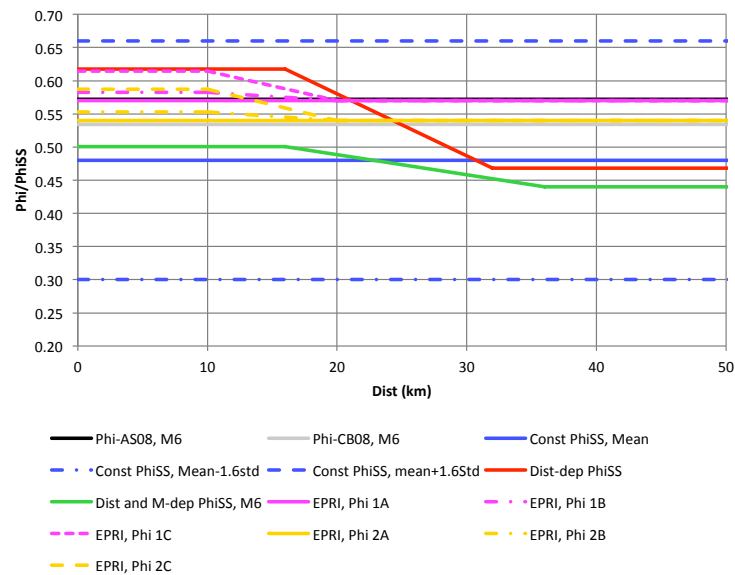
At 1 Hz



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Comparison of Phi and PhiSS Models (cont'd)

At 5 Hz



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Simplified SSC Model

- Gridded seismicity – USGS 2002
- New Madrid seismic zone - USGS 2008
- Charleston seismic zone – USGS 2008

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Test Sites



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Hazard Results at Chattanooga – at PGA

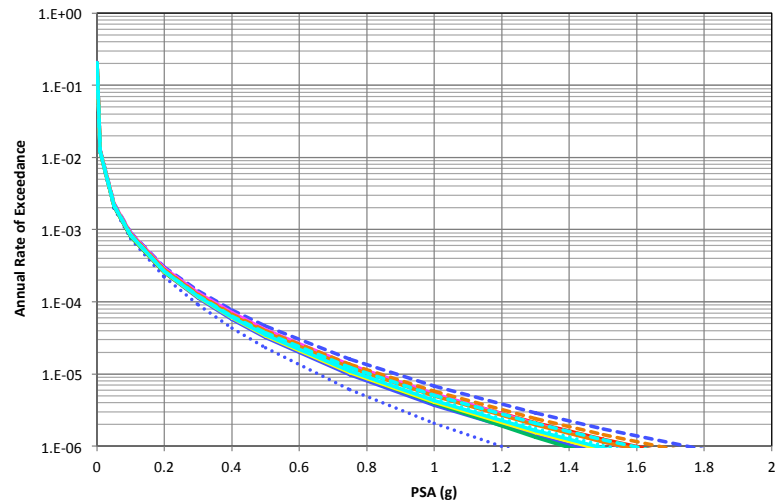
PGA

RT 100,000 yrs:

Mbar = 6.14

Rbar = 19 km

Epsbar = 1.26



PRP PhiSS Const Mean
 PRP Dist-Dep PhiSS
 Phi CB08
 EPRI 2006 Phi 1C
 EPRI 2006 Phi 2C
 PRP PhiSS Const Mean - 1.6std
 PRP Mag & Dist-Dep PhiSS
 EPRI 2006 Phi 1A
 EPRI 2006 Phi 2A
 PRP PhiSS Const Mean + 1.6std
 Phi AS08
 EPRI 2006 Phi 1B
 EPRI 2006 Phi 2B

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Hazard Results at Chattanooga – at 5 Hz

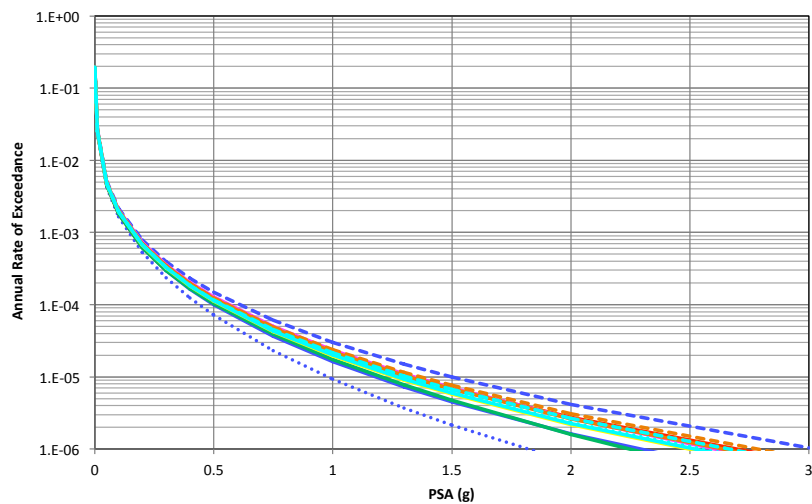
At 5 Hz

RT 100,000 yrs:

Mbar = 6.15

Rbar = 20 km

Epsbar = 1.42



PRP PhiSS Const Mean
 PRP Dist-Dep PhiSS
 Phi CB08
 EPRI 2006 Phi 1C
 EPRI 2006 Phi 2C
 PRP PhiSS Const Mean - 1.6std
 PRP Mag & Dist-Dep PhiSS
 EPRI 2006 Phi 1A
 EPRI 2006 Phi 2A
 PRP PhiSS Const Mean + 1.6std
 Phi AS08
 EPRI 2006 Phi 1B
 EPRI 2006 Phi 2B

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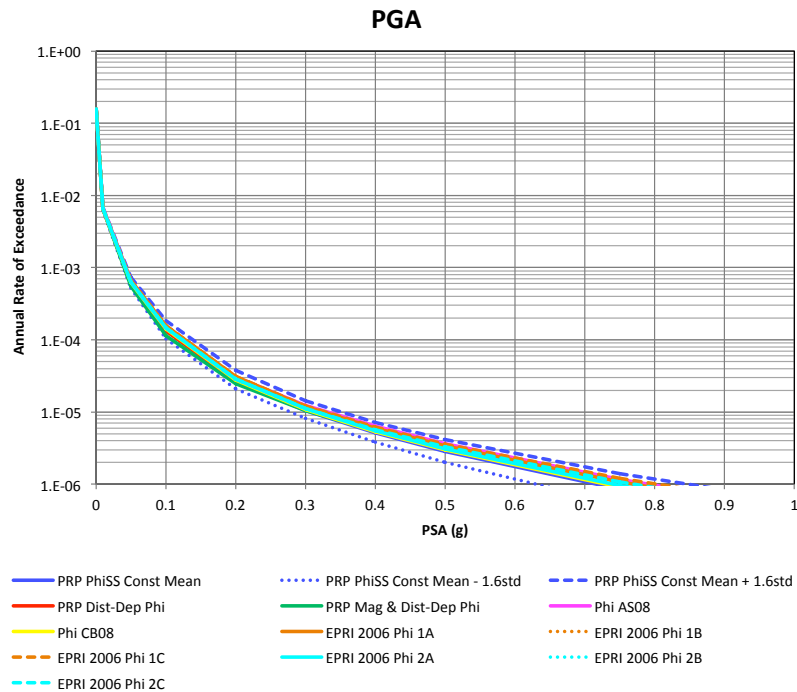
Hazard Results at Savannah – at PGA

RT 100,000 yrs:

Mbar = 5.92

Rbar = 26 km

Epsbar = 0.74



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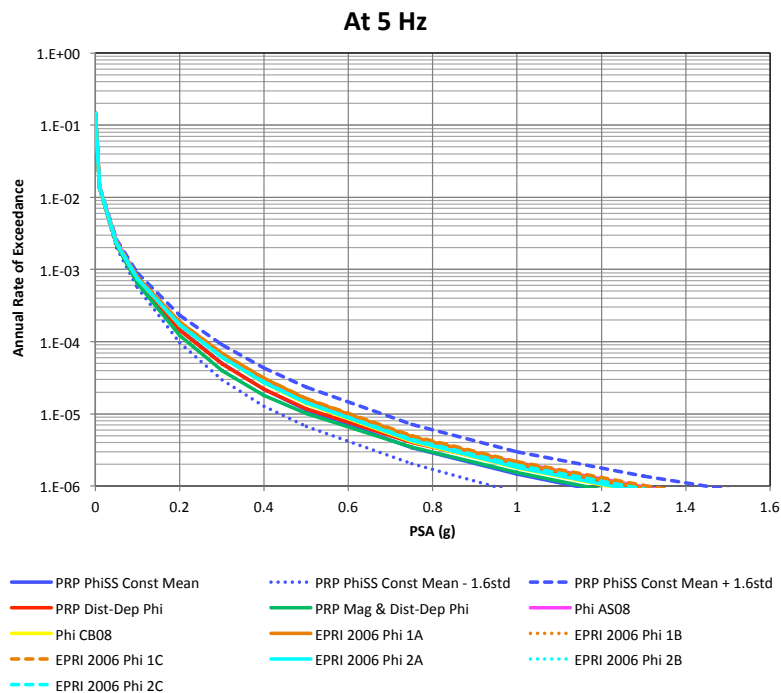
Hazard Results at Savannah – at 5 Hz

RT 100,000 yrs:

Mbar = 6.3

Rbar = 46 km

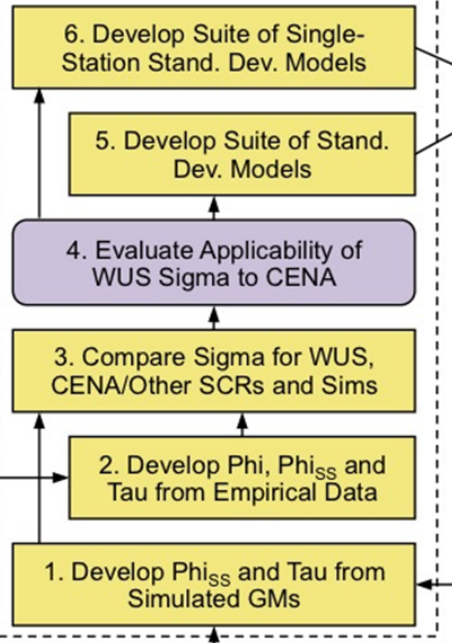
Epsbar = 1.3



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Status Update on Sigma WG Tasks

J. Standard Deviation (Sigma)



No progress due to delays in receiving the small-to-moderate magnitude data for WUS and the CENA data.