

Validation of Finite Fault Simulations – Summary of Results

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Key points:

- All URS simulations were done on the SCEC Broadband Platform following the methodology of Graves and Pitarka, 2010,
- We used one set of standard parameters for tectonically active regions and another set for tectonically stable regions
- The objective is to test the predictive capabilities of our methodology in a “blind” fashion versus well recorded events
- Therefore only minimal (and justifiable) adjustments were made from the parameters for the applicable region
 - e.g. used standard stable region stress drop $\Delta\sigma = 143$ for Saguenay earthquake
 - No adjustments were made to parameters to improve results

Model Parameters

Region/ Event	Scenario Parameters				Fixed Parameters				
	Mo ($\times 10^{17}$ N-m)	Mo Reference	Slip Model	Crustal Model	HF stress parameter $\Delta\sigma$	Kappa, K	freq scale factor, z	Rise time coefficient , TR	HF Q Model
Active Tectonic Regions	-	-	-	-	50	0.04	1.6	1.6	$(41 + 34V_s)f^{0.6}$
Stable Regions	-	-	-	-	143	0.006	0.86	3.75	$(164 + 34V_s)f^{0.45}$
Saguenay	5.85	Hartzell et al., 1994	Hartzell et al., 1994	Hartzell et al., 1994	143	0.006	0.86	3.75	$(164 + 34V_s)f^{0.45}$
Riviere du Loup	0.0902	Hermann	N/A	Hermann	143	0.006	0.86	N/A	$(164 + 34V_s)f^{0.45}$
Tottori	86.2	Fukuyama et al., 2003	Sekiguchi et al., 2003	Iwata and Sekiguchi, 2002	50	0.006	1.6	1.6	$(164 + 34V_s)f^{0.45}$
Loma Prieta	183	Graves and Pitarka, 2010	Graves and Pitarka, 2010	Graves and Pitarka, 2010	50	0.04	1.6	1.6	$(41 + 34V_s)f^{0.6}$
Northridge	117	Graves and Pitarka, 2010	Graves and Pitarka, 2010	Graves and Pitarka, 2010	50	0.04	1.6	1.6	$(41 + 34V_s)f^{0.6}$
Imperial Valley	60.2	Graves and Pitarka, 2010	Graves and Pitarka, 2010	Graves and Pitarka, 2010	50	0.04	1.6	1.6	$(16 + 34V_s)f^{0.6}$
Chi Chi	3110	Ma et al., 2001	Ma et al., 2001	Ma et al., 2001	50	0.04	1.6	1.6	$(41 + 34V_s)f^{0.6}$

Tottori: Use Stable Region path parameters (Q, K) – granitic terrain with low attenuation properties

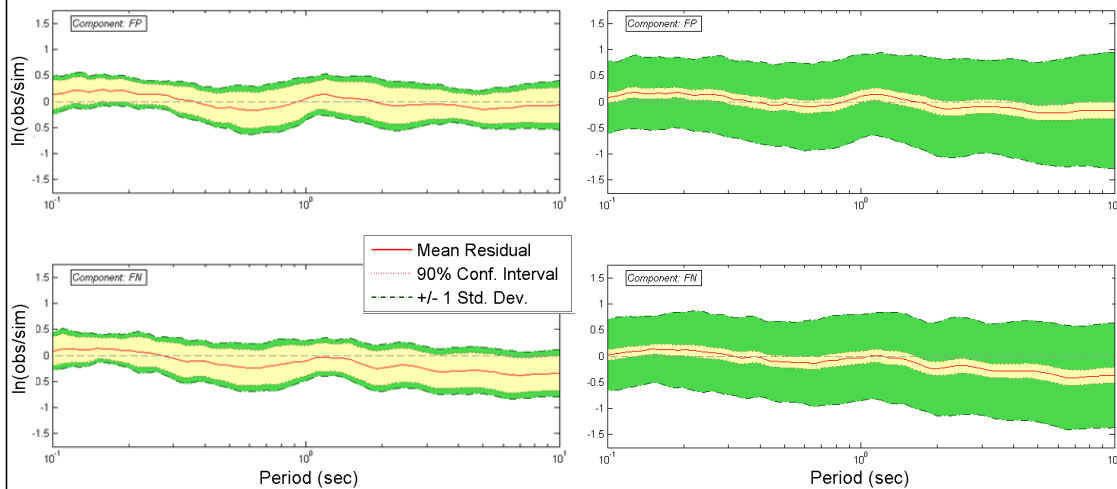
Imp. Valley: Modify HF Q model – thick low velocity sediments in the Imperial Valley



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Average Residuals: Goodness-of-fit (GOF)

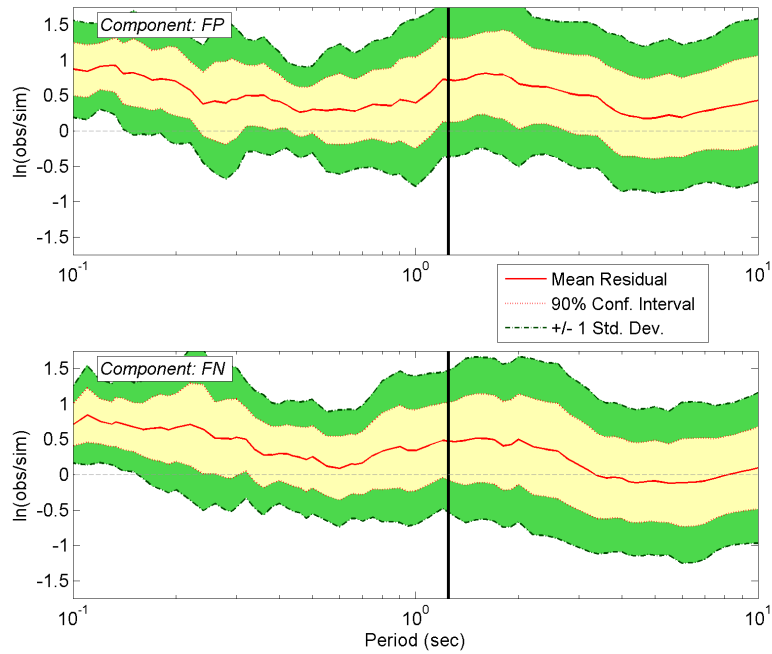


Average over 7 events, equal weight to each
(N=7)

Average over all simulations
(N=130)

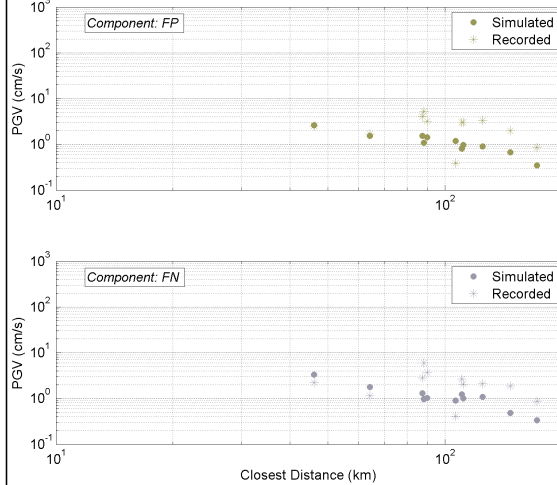
Event I: Saguenay

[Saguenay - 2477771] GOF Comparison, 11 Validation Stations

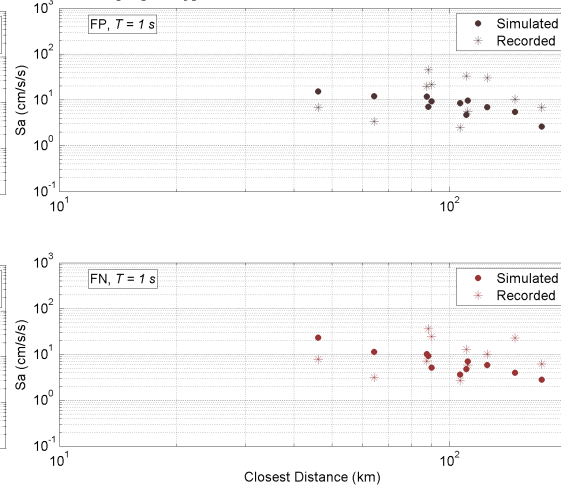


Event I: Saguenay

[Saguenay] PGV vs. Closest Distance, 11 Validation Stations

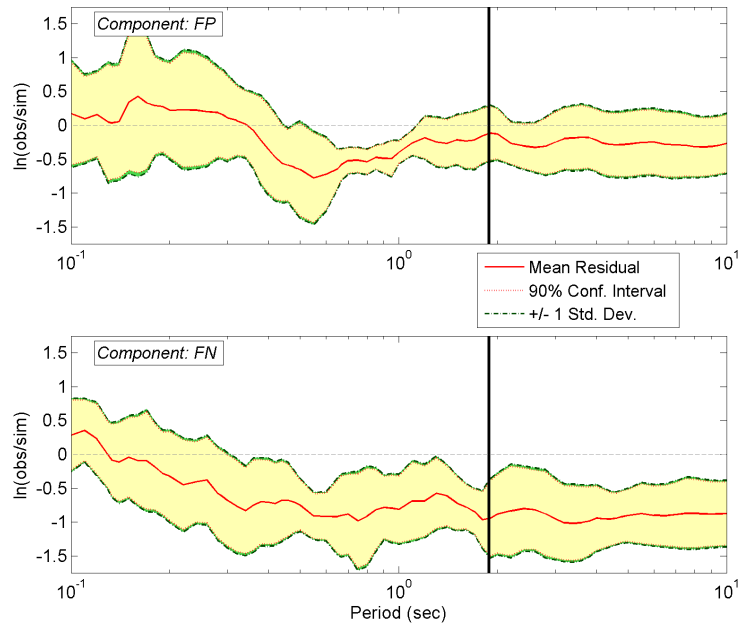


[Saguenay] Sa vs. Closest Distance, 11 Validation Stations

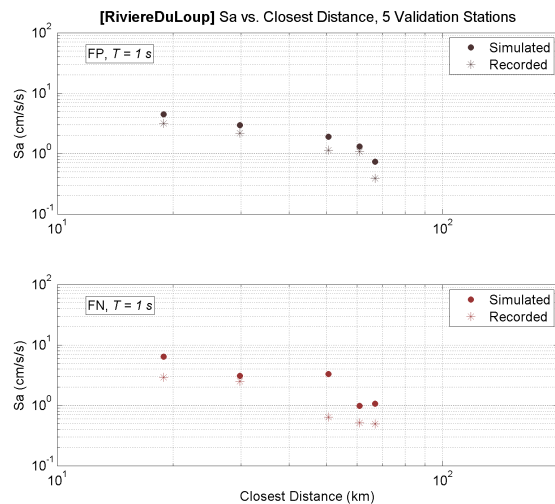
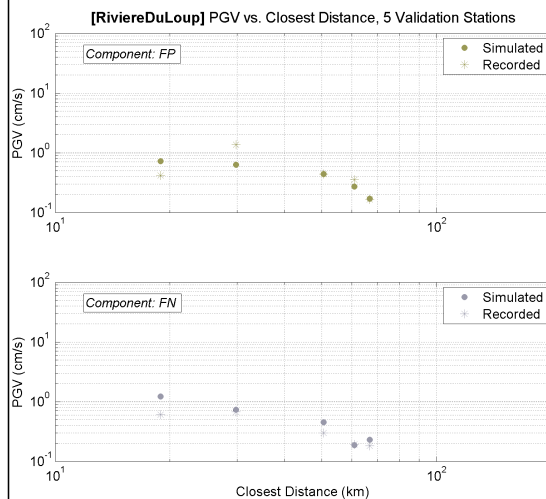


Event II: Riviere du Loup

[RiviereDuLoup - 2416462] GOF Comparison, 5 Validation Stations

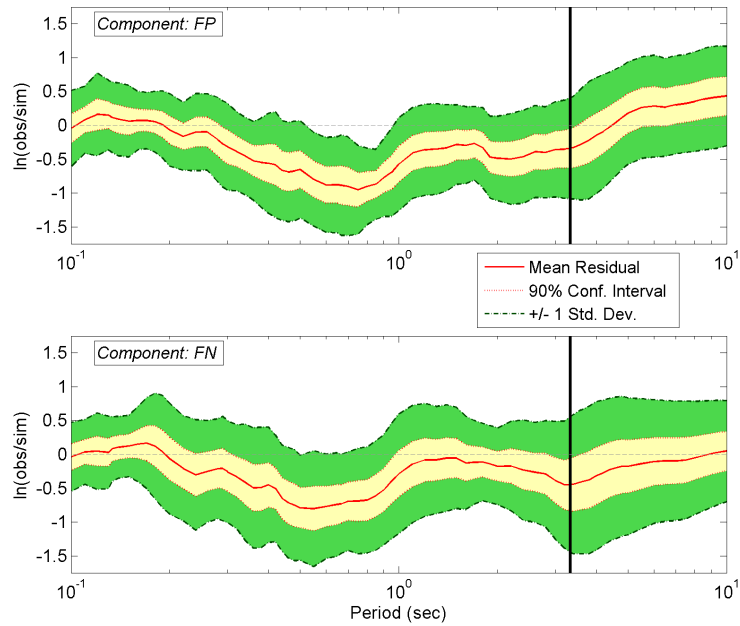


Event II: Riviere du Loup

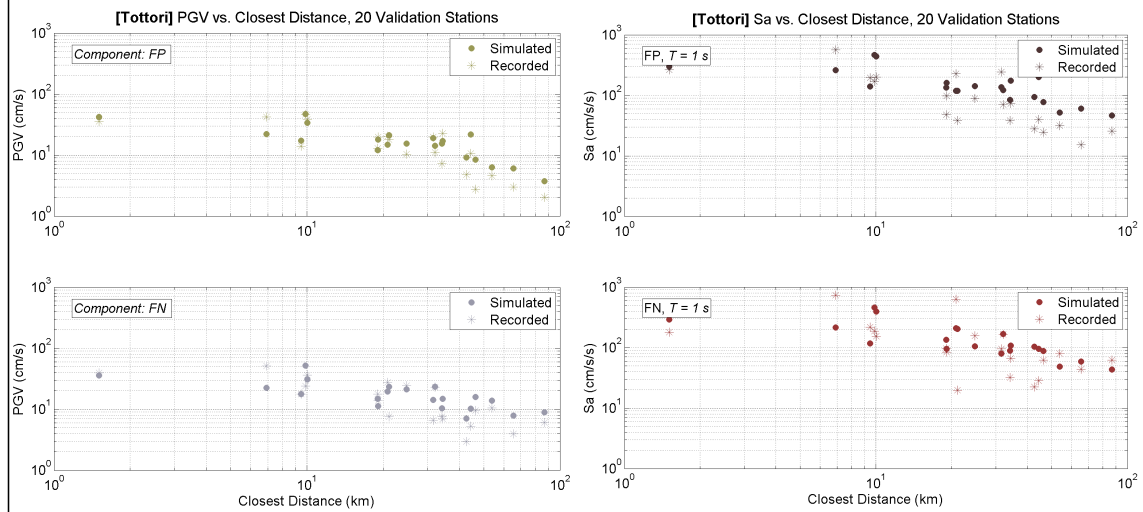


Event III: Tottori

[Tottori - 2418789] GOF Comparison, 20 Validation Stations

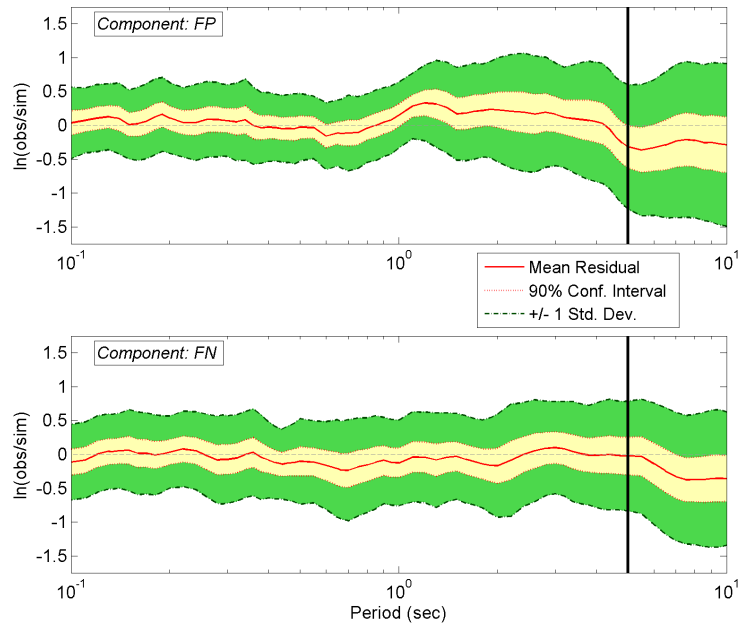


Event III: Tottori



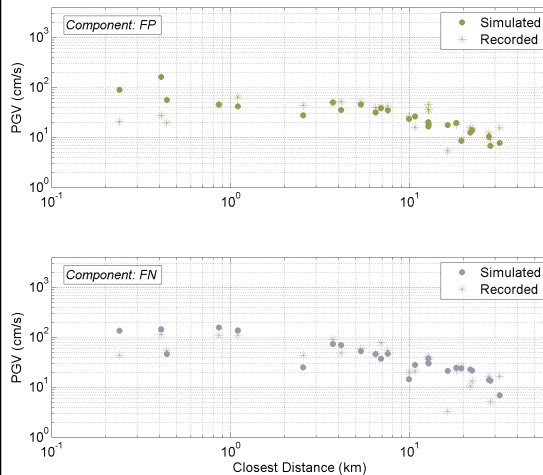
Event IV: Imperial Valley

[ImperialValley - 4894103] GOF Comparison, 25 Validation Stations

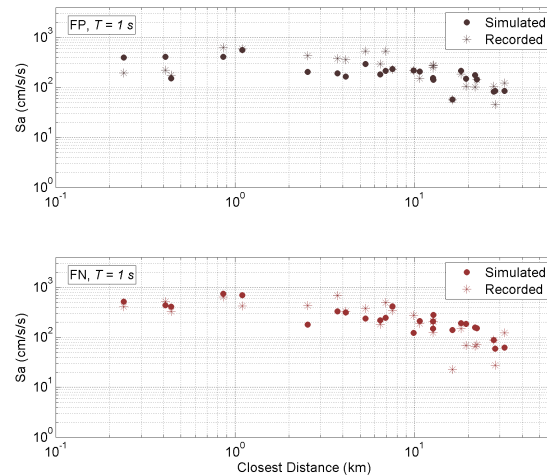


Event IV: Imperial Valley

[ImperialValley] PGV vs. Closest Distance, 25 Validation Stations

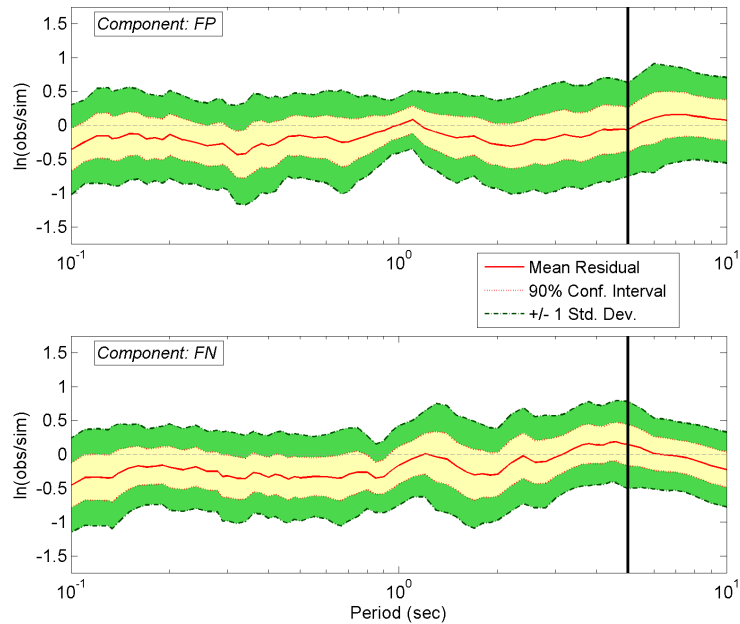


[ImperialValley] Sa vs. Closest Distance, 25 Validation Stations



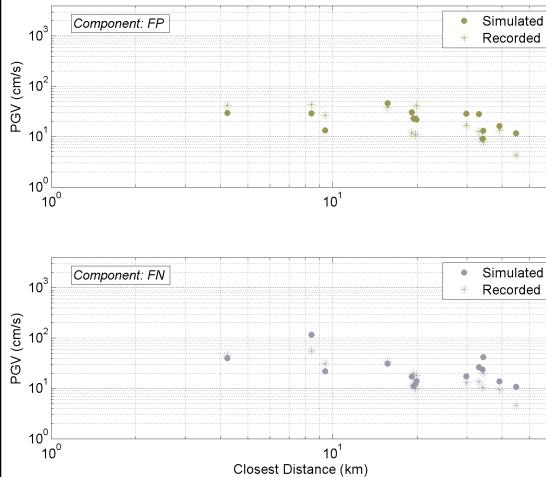
Event V: Loma Prieta

[LomaPrieta - 2833162] GOF Comparison, 14 Validation Stations

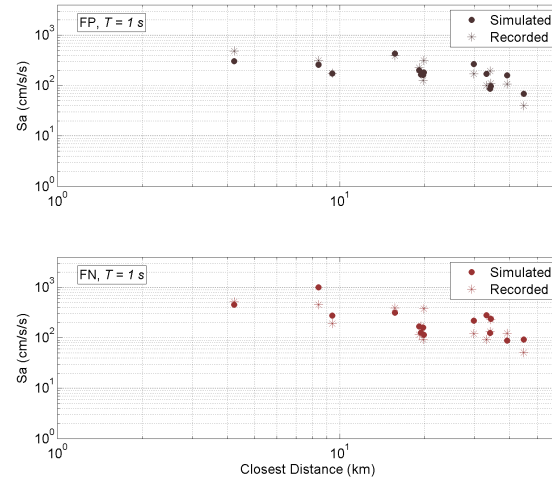


Event V: Loma Prieta

[LomaPrieta] PGV vs. Closest Distance, 14 Validation Stations

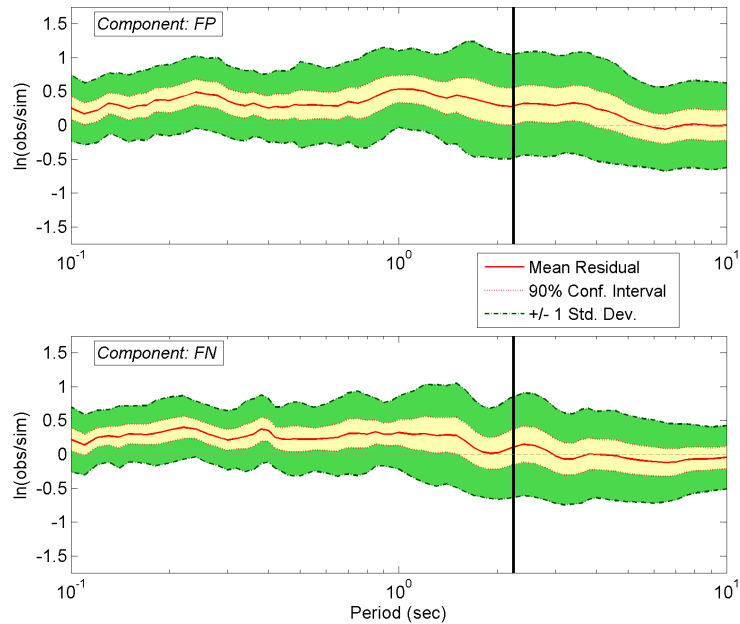


[LomaPrieta] Sa vs. Closest Distance, 14 Validation Stations



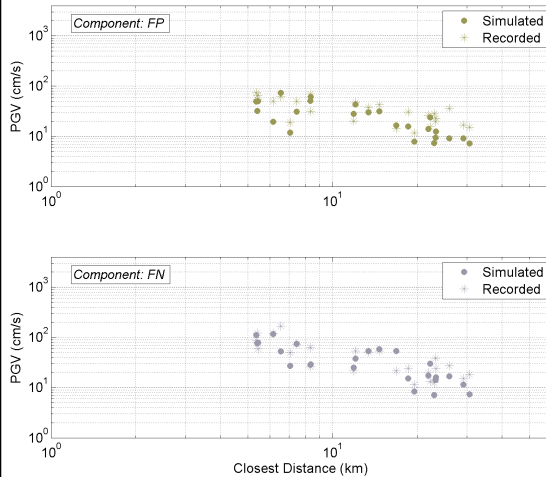
Event VI: Northridge

[Northridge - 4992407] GOF Comparison, 24 Validation Stations

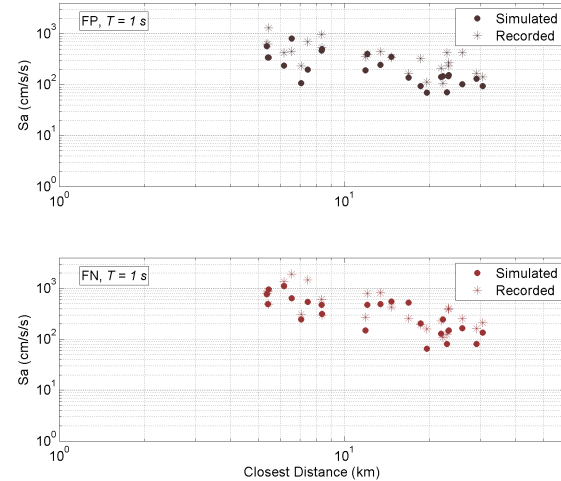


Event VI: Northridge

[Northridge] PGV vs. Closest Distance, 24 Validation Stations

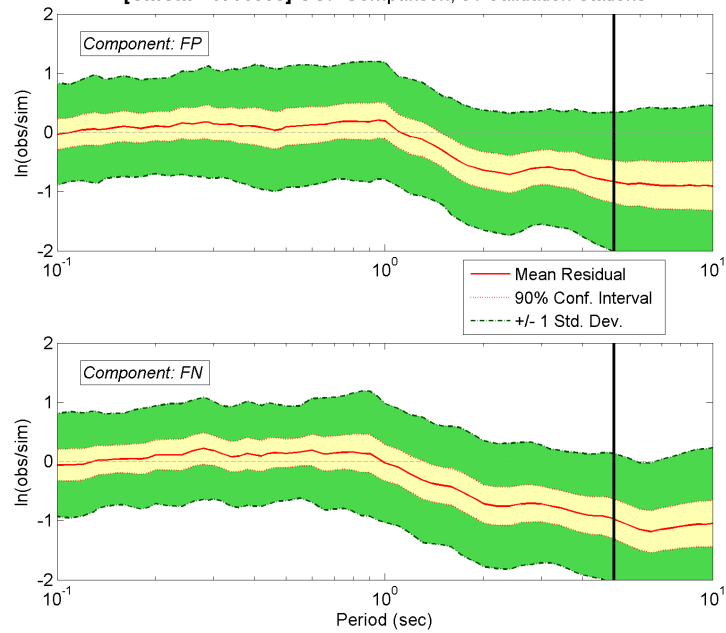


[Northridge] Sa vs. Closest Distance, 24 Validation Stations



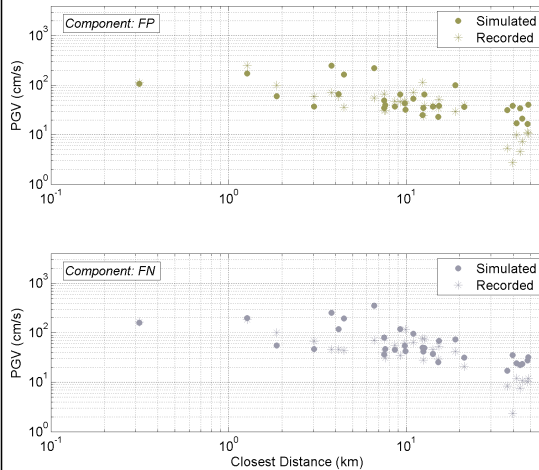
Event VII: Chi-Chi

[ChiChi - 4911305] GOF Comparison, 31 Validation Stations



Event VII: Chi-Chi

[ChiChi] PGV vs. Closest Distance, 31 Validation Stations



[ChiChi] Sa vs. Closest Distance, 31 Validation Stations

