

Project 17 – 2020 NEHRP Maps

- Every 6 years or longer
- Precision given uncertainty
- Levels (MCE_R + SLE + ?)
- Multiple periods, T
- Damping ratios besides 5%
- Basins (few cities or all US)
- Uniform hazard or risk?
- Deterministic caps (M_{max} ?)
- Fragility (M8-9 vs M7)
- Max direction vs geomean
- Vertical component
- Induced seismicity
- Site factors for CEUS
- Physics-based models
- Other topics ?

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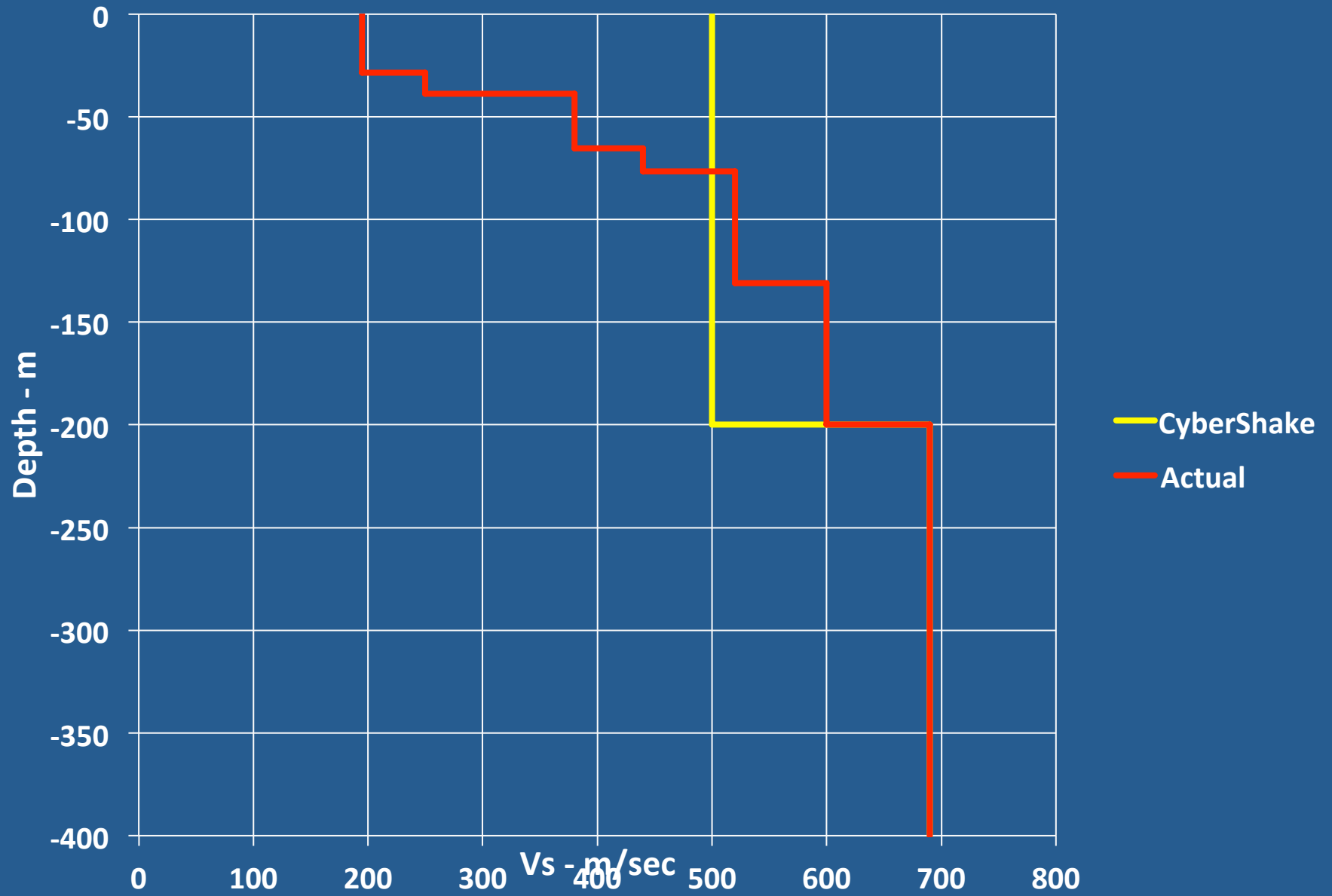
Site-Response Analysis

Purpose: Check Effect on long period response spectra to realistic soil properties in upper 200m

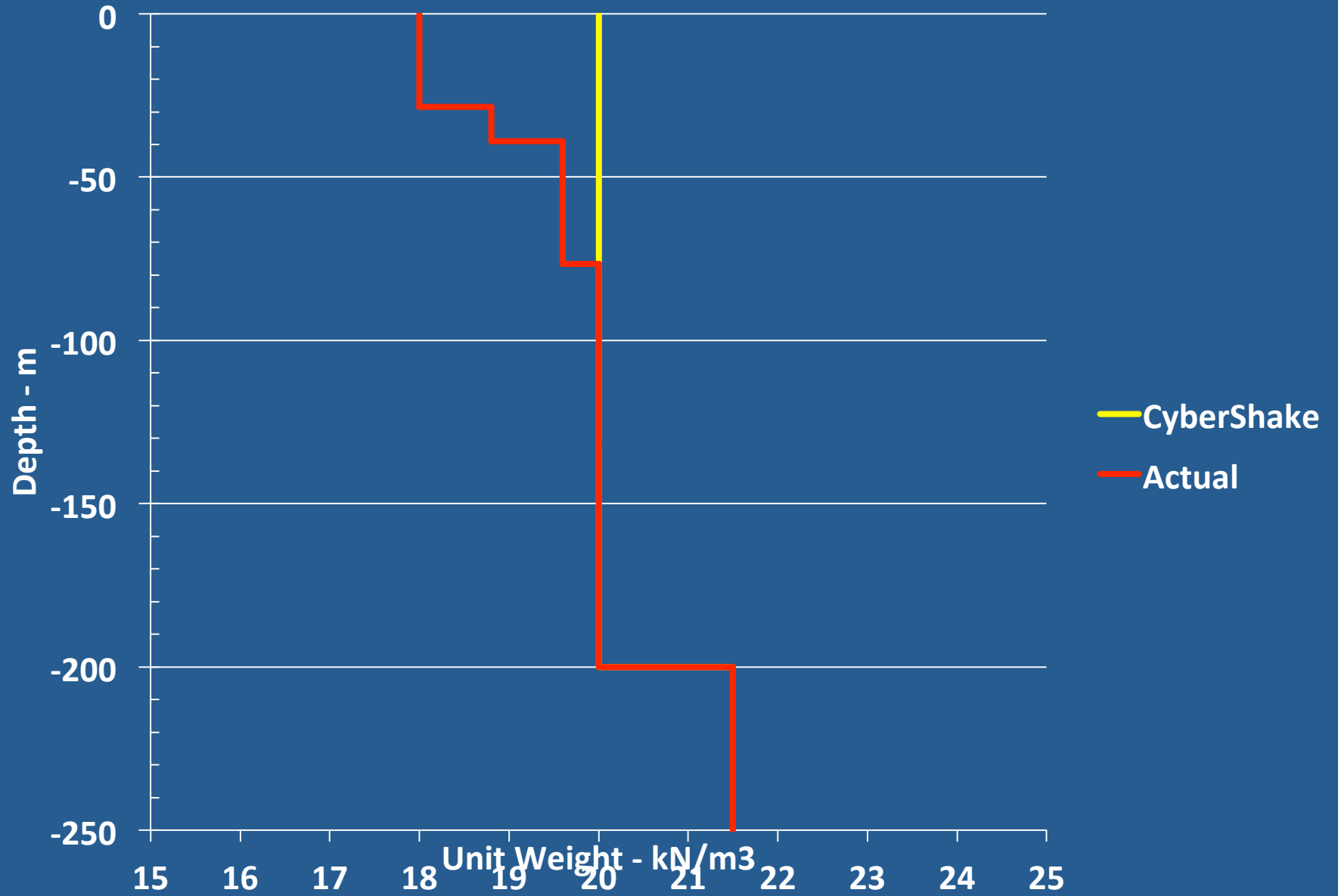
Test Case: Carson, s429

- 1-D Linear & nonlinear SRA
- Actual & CyberShake soil properties in upper 200m
- Input-outcrop at 200-m depth: 1978 Tabas, Iran accelerogram (M7.4)

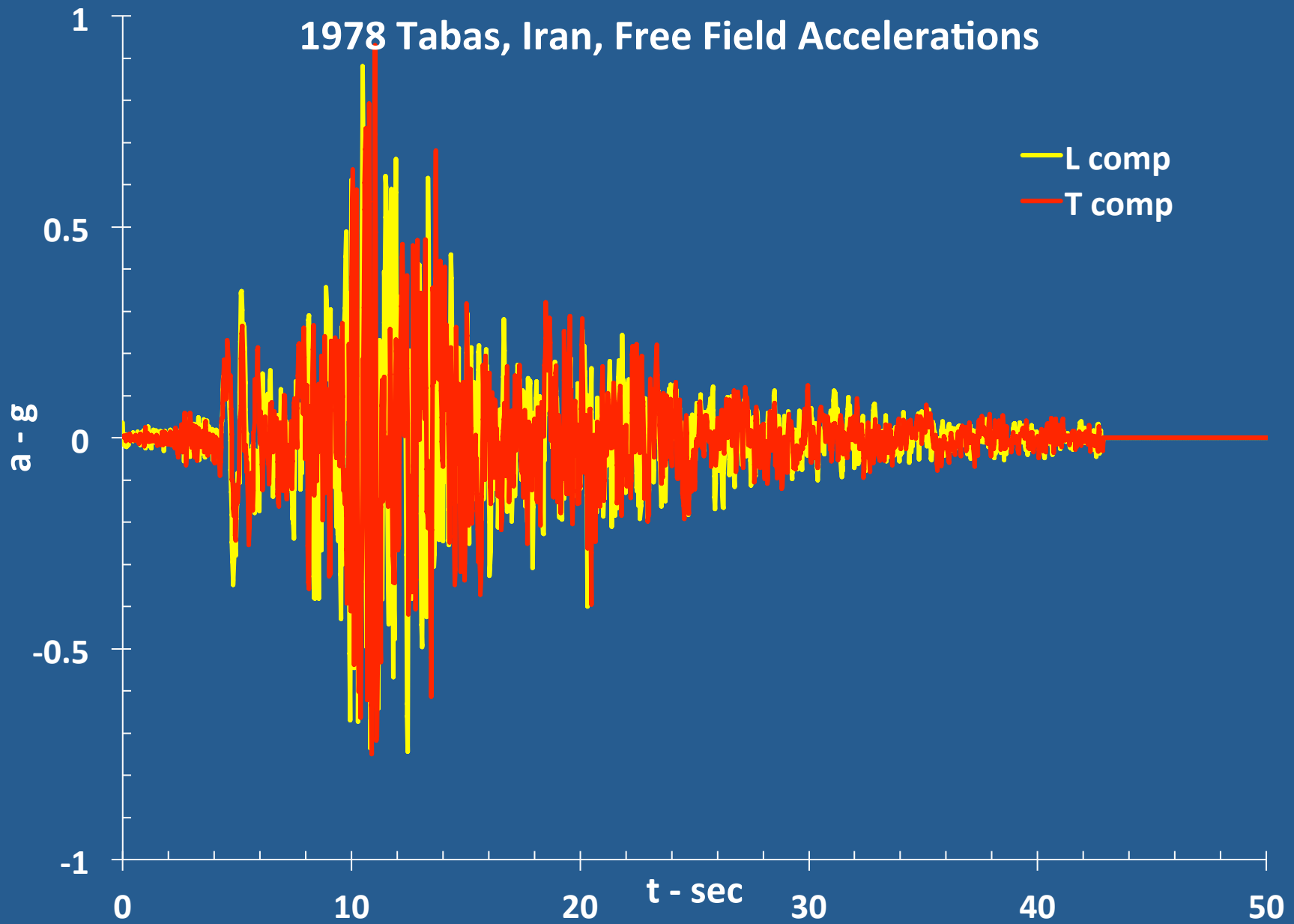
Vs Profiles. Carson Site, s429



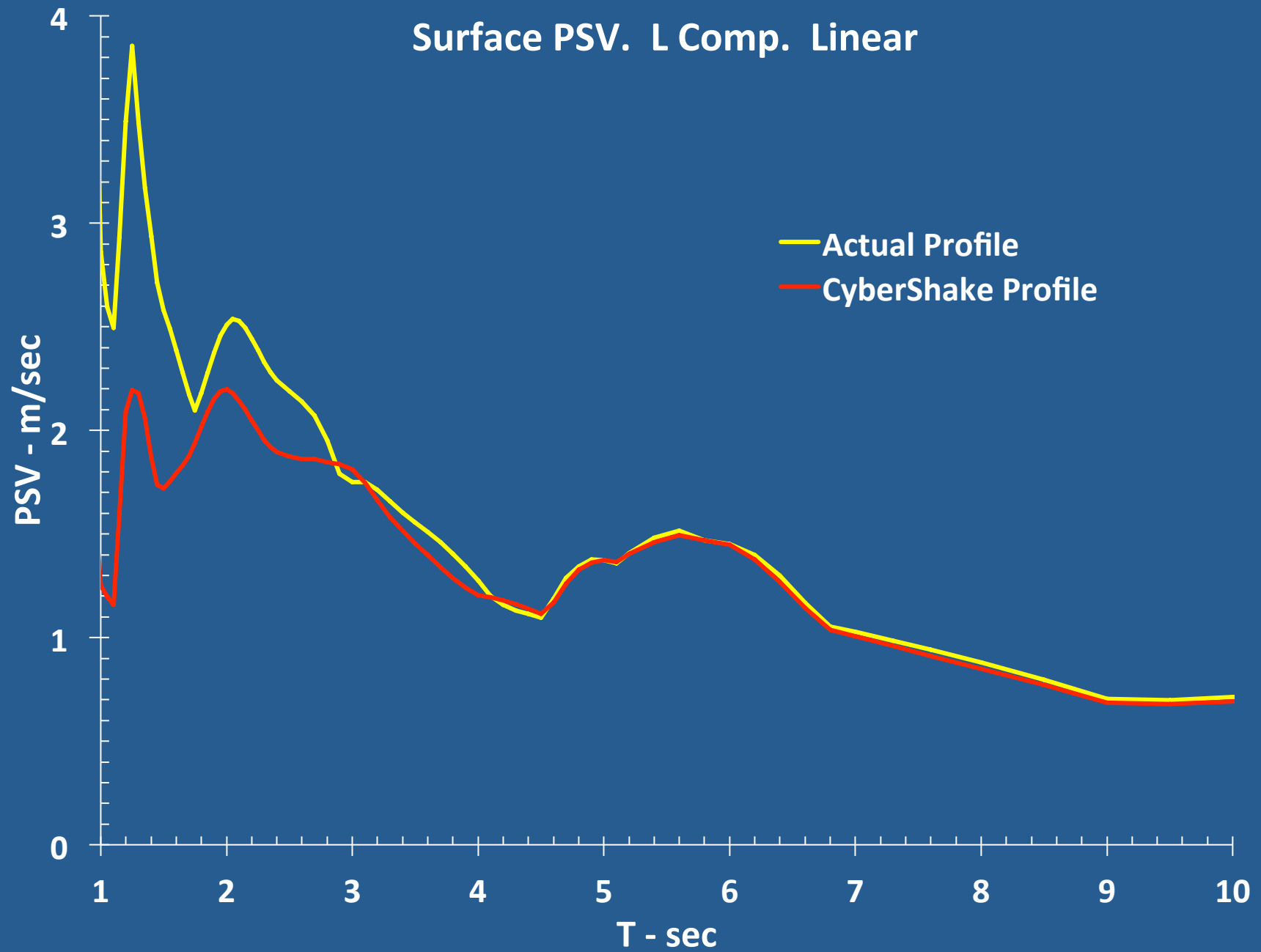
Density Profiles. Carson Site, s429



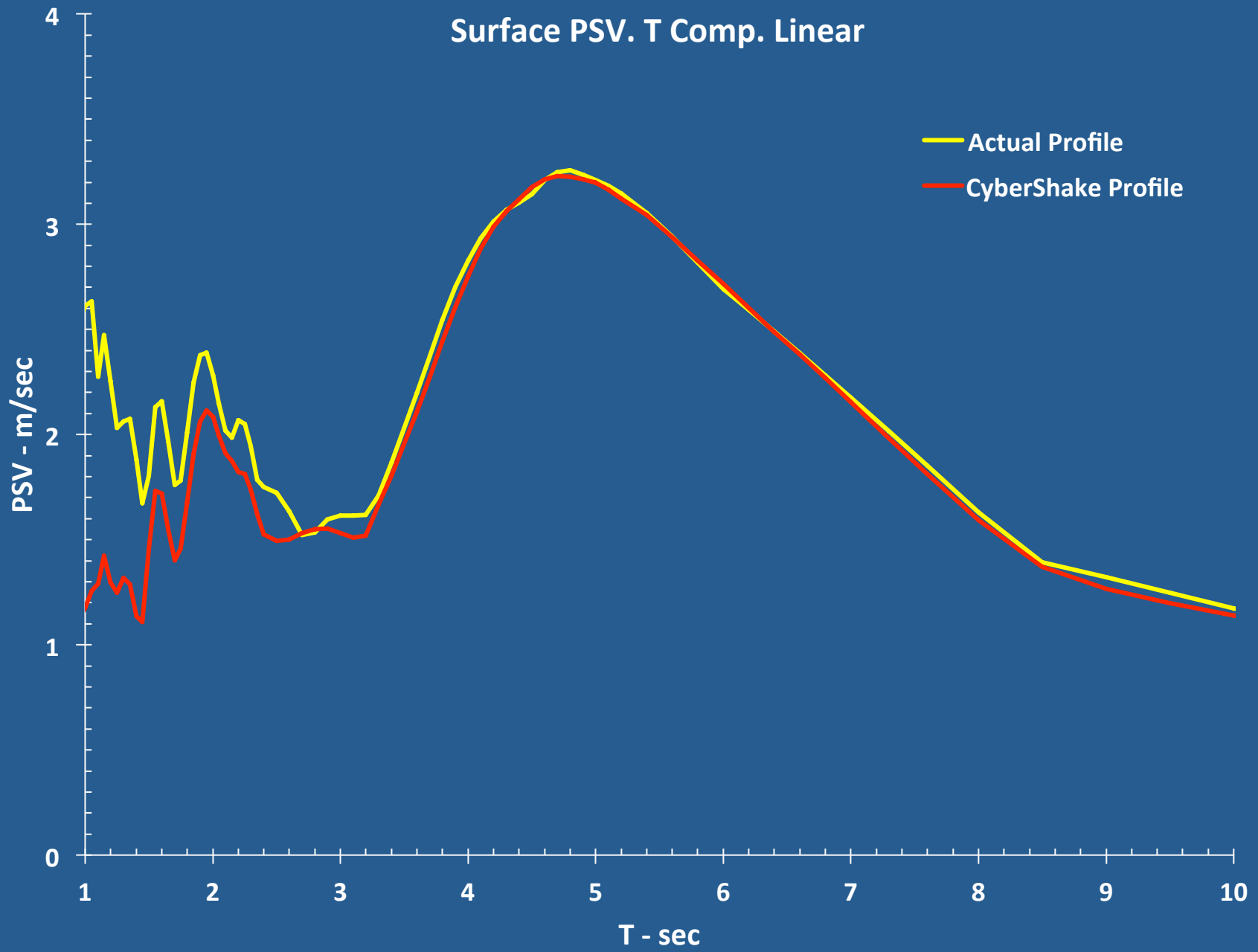
1978 Tabas, Iran, Free Field Accelerations



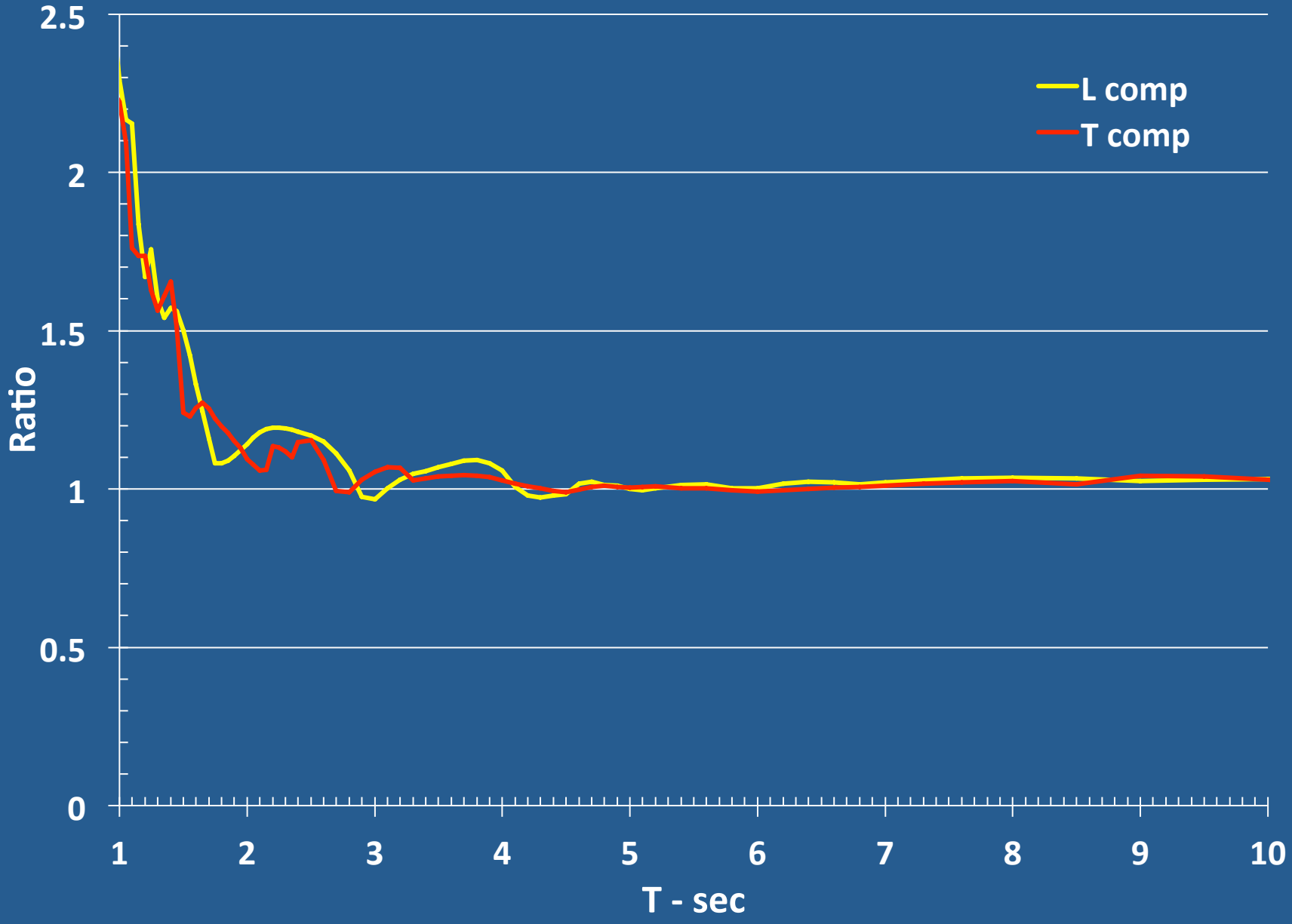
Surface PSV. L Comp. Linear



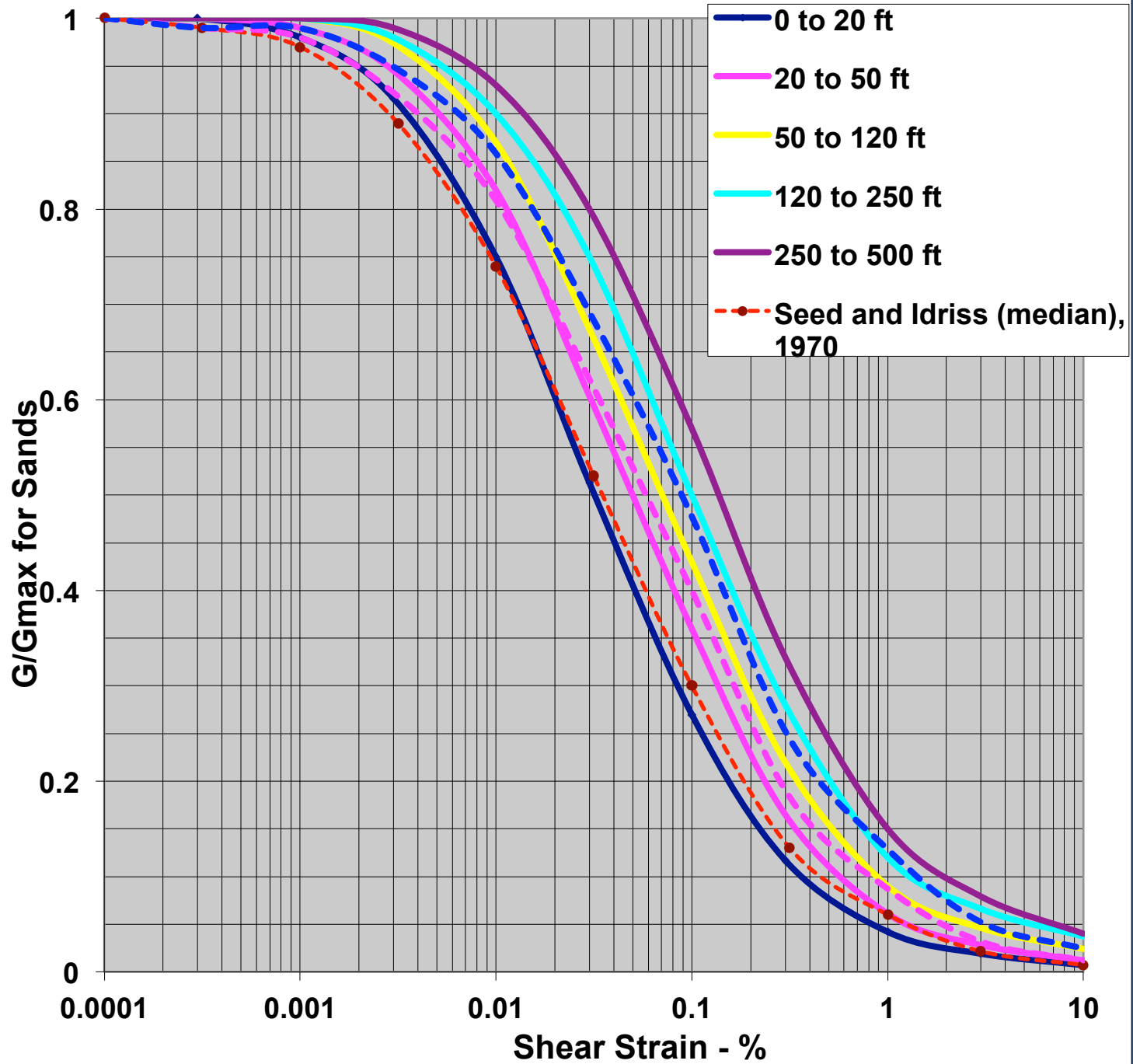
Surface PSV. T Comp. Linear

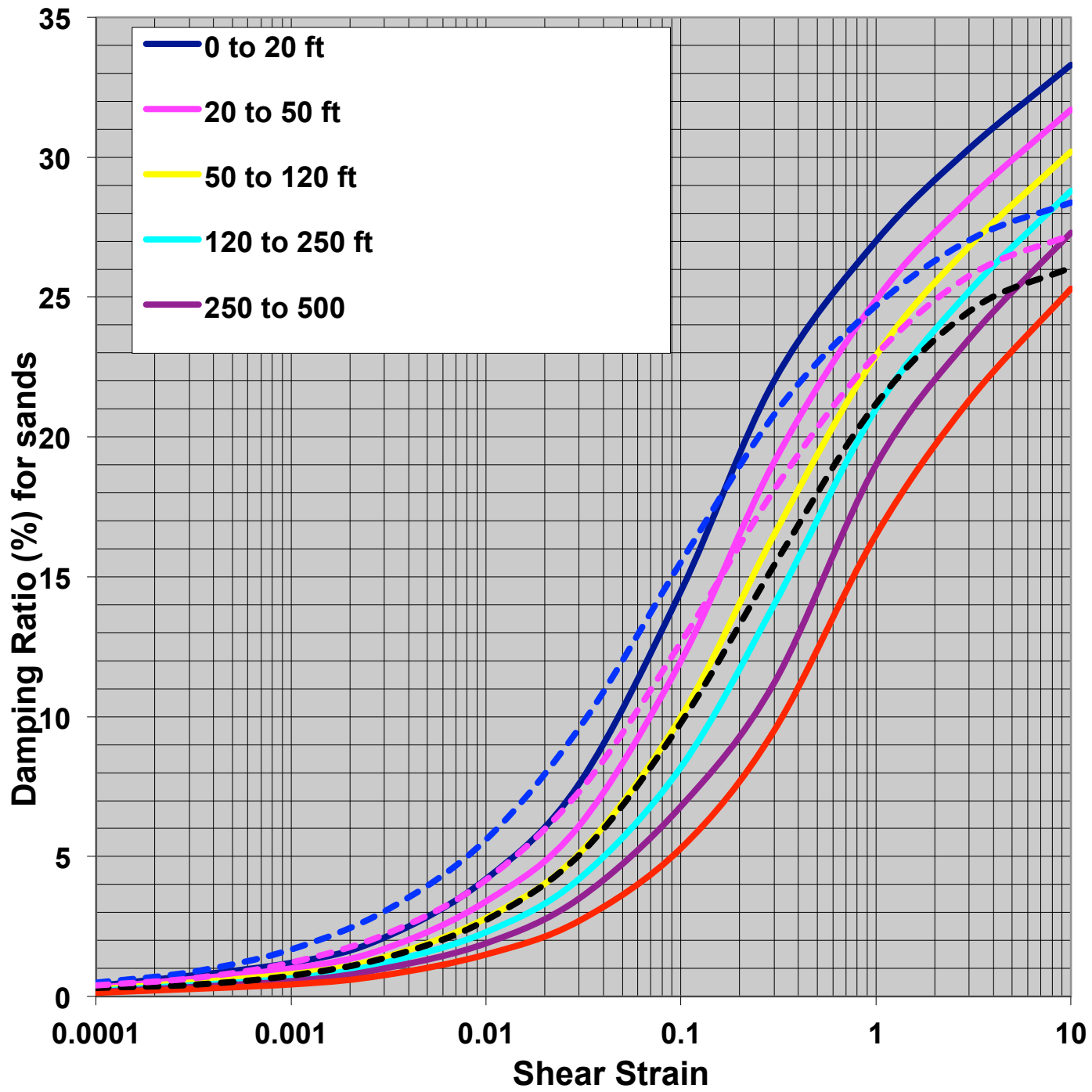


PSV Ratios (Actual/CyberShake). Linear.

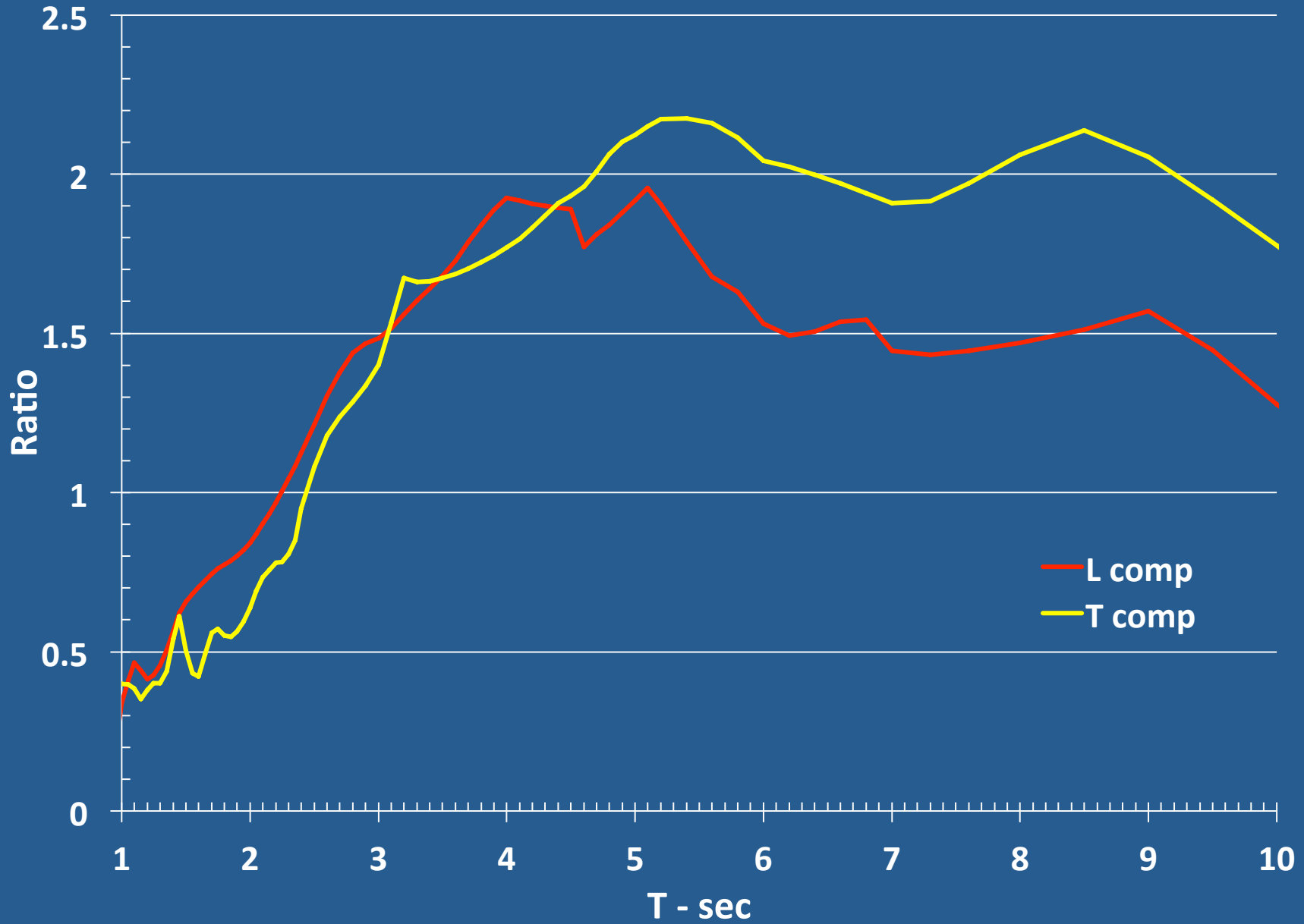


Nonlinear Model (SHAKE)





PSV Ratios (Actual/CyberShake). Non-Linear.



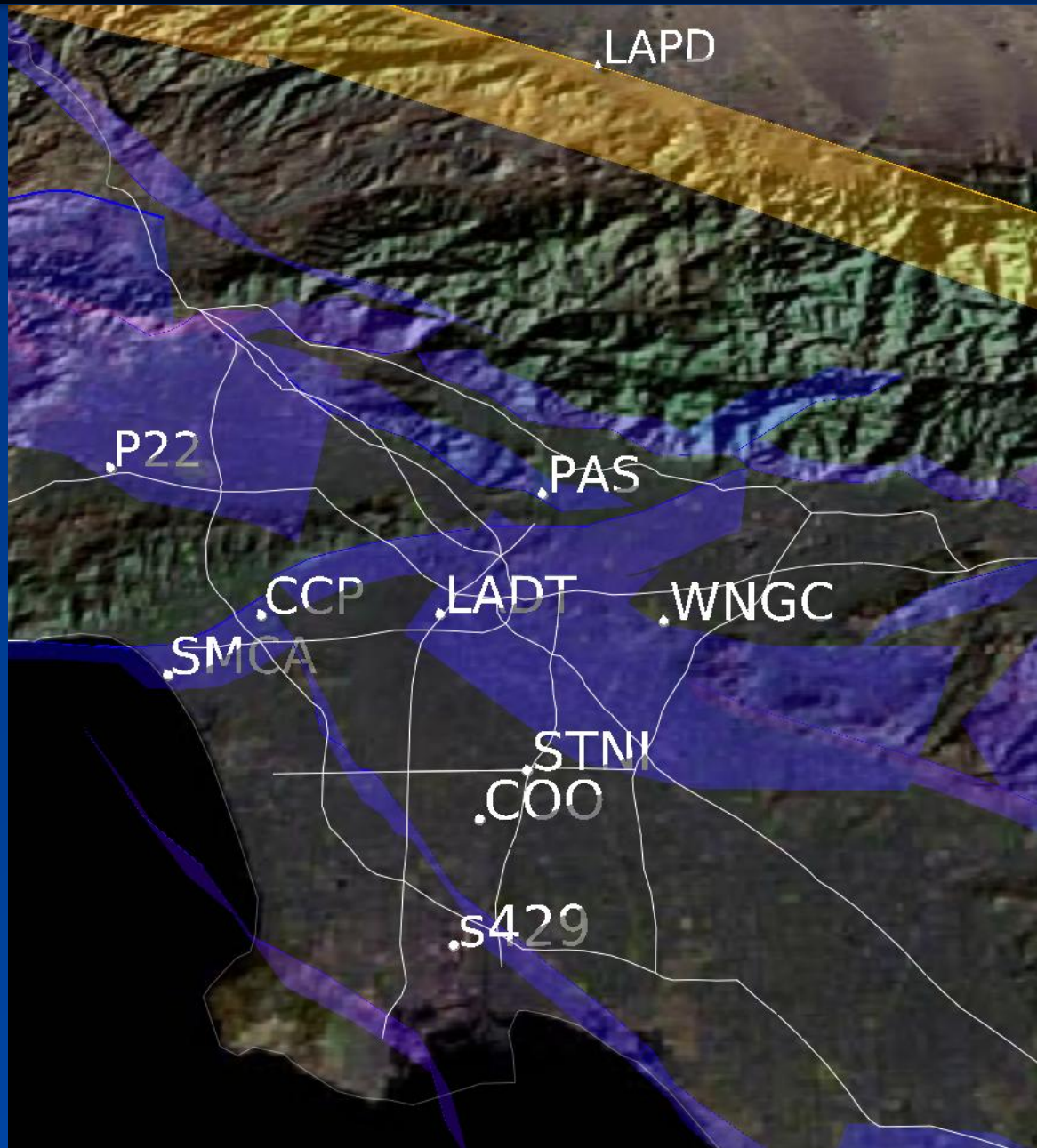
Revised Site-Response Analysis

- Prof. Domniki Asimaki to present results using more realistic soil models subjected to scaled versions of the Tabas records

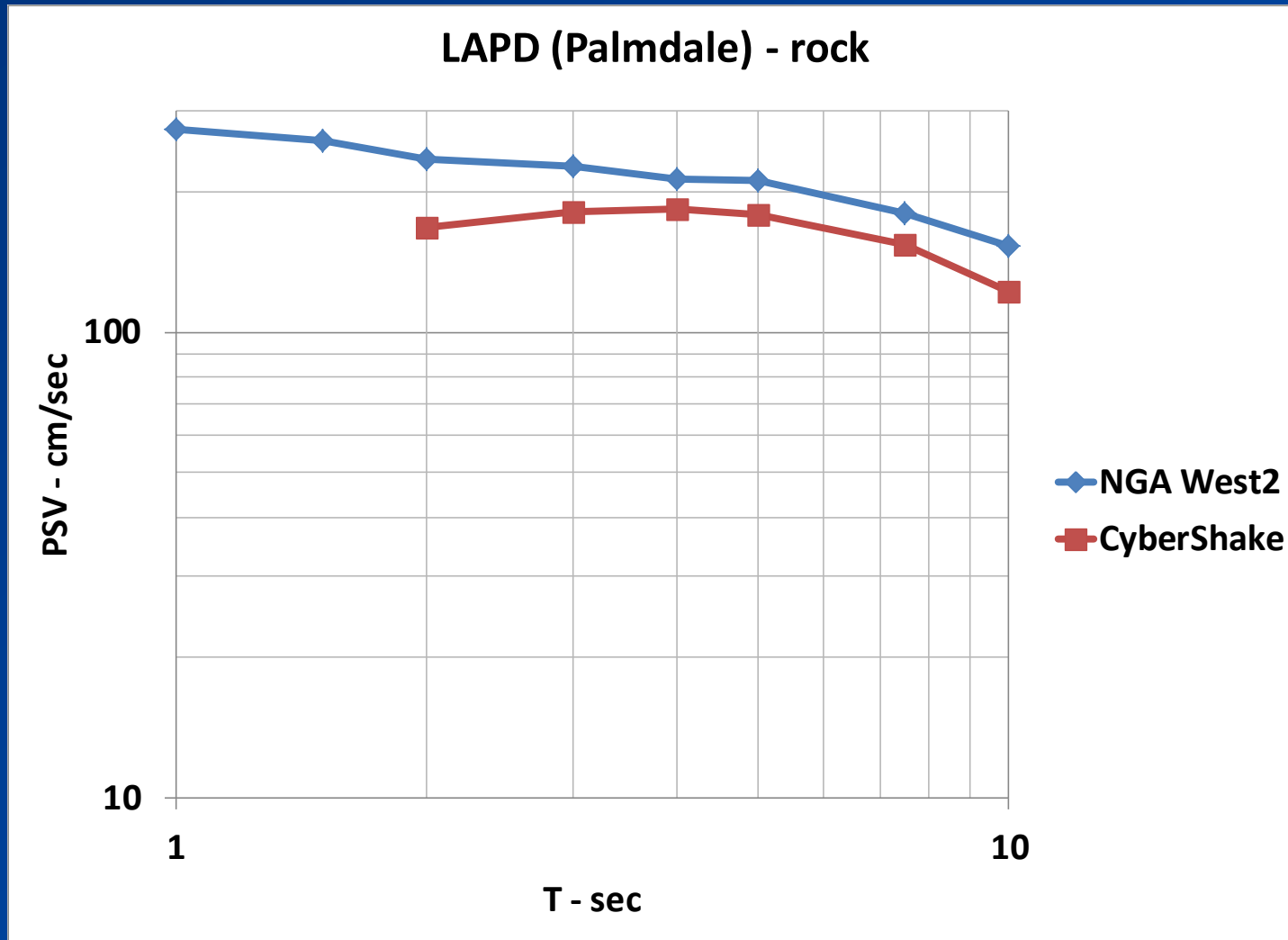
MCE_R from CyberShake & NGA West2

- MCE_R response spectra for 14 sites
- $1.0 \leq T \leq 10$ sec
- Problem with Deterministic MCER (since been corrected)

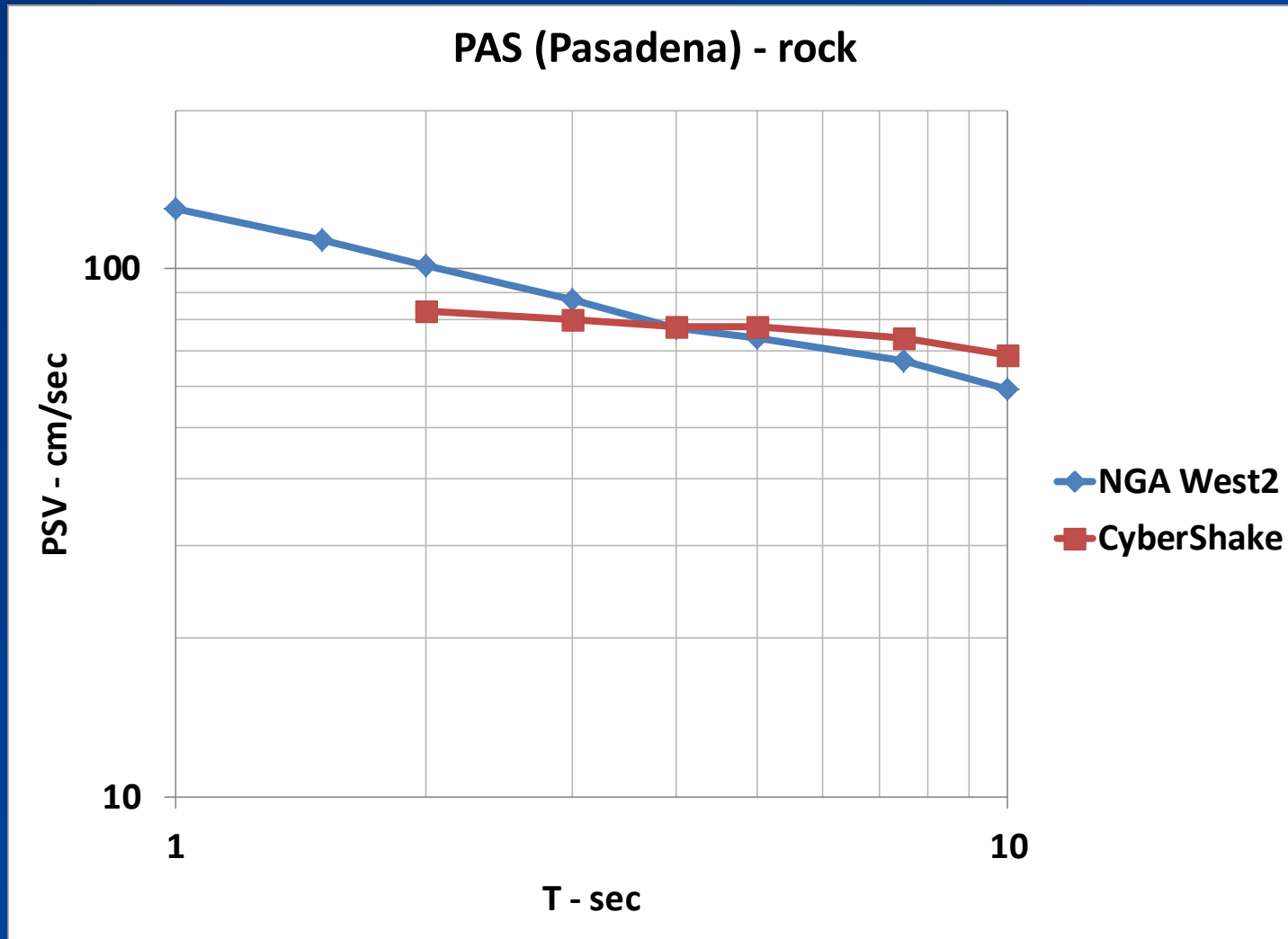
Los Angeles Sites



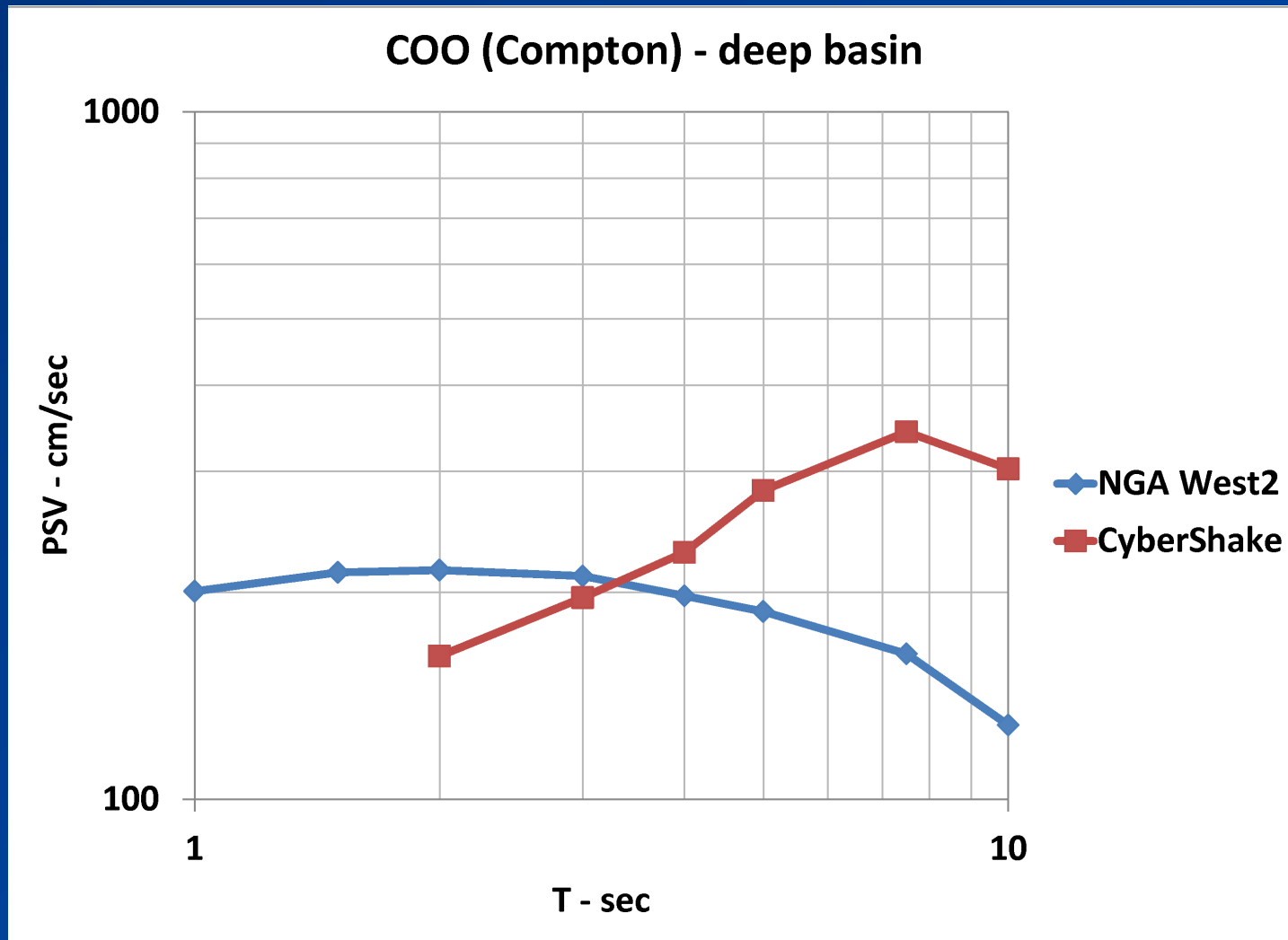
LAPD MCE_R



PAS MCE_R

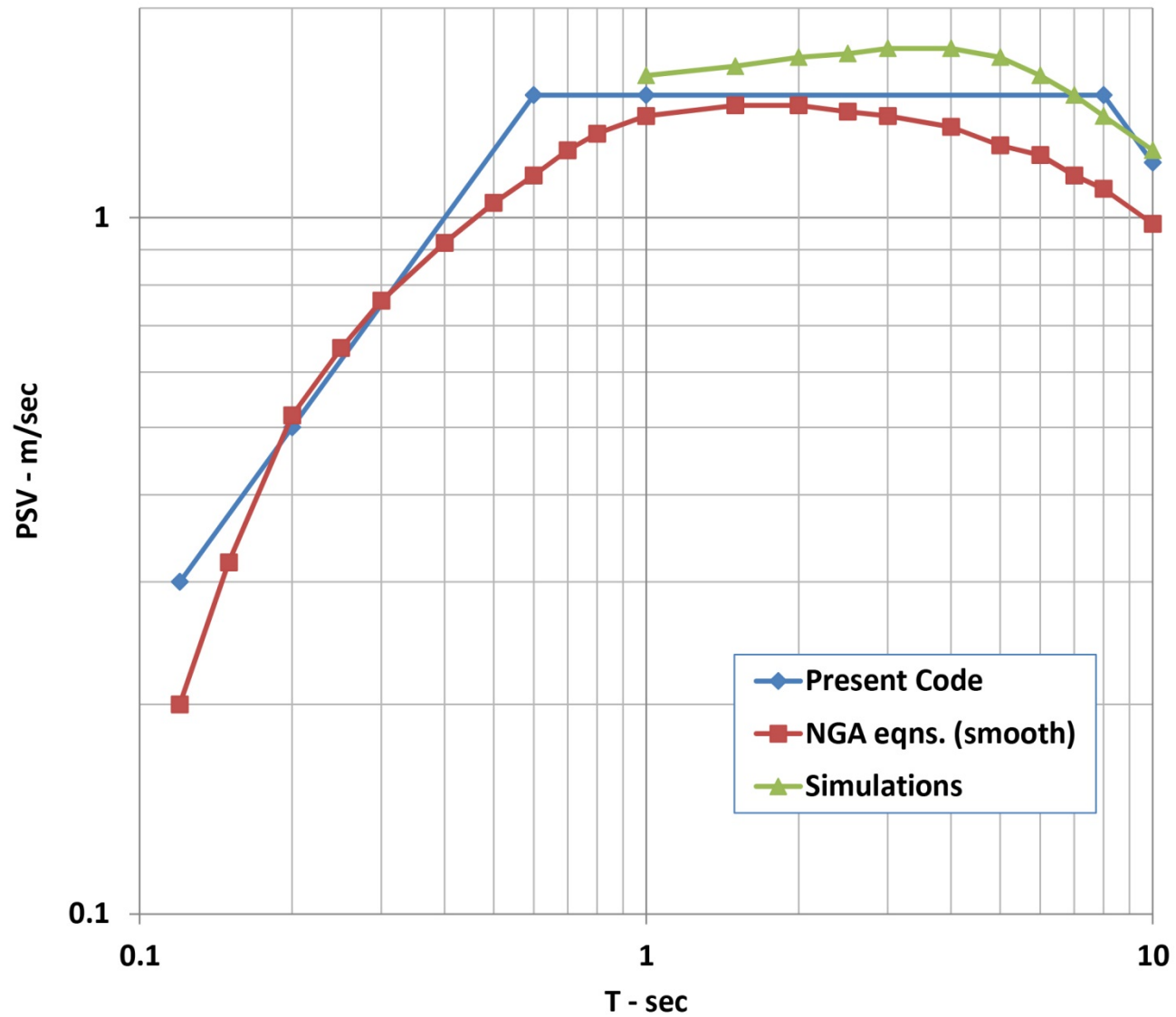


COO MCE_R



MCE_R Response Spectra, Multiple Sites, L.A. Region

MCE Response Spectra, Site X, L.A. Pilot Study



Combine CyberShake & NGA West2

Average MCER Spectra

Weighted arithmetic or
geometric mean

Average Hazard Curves

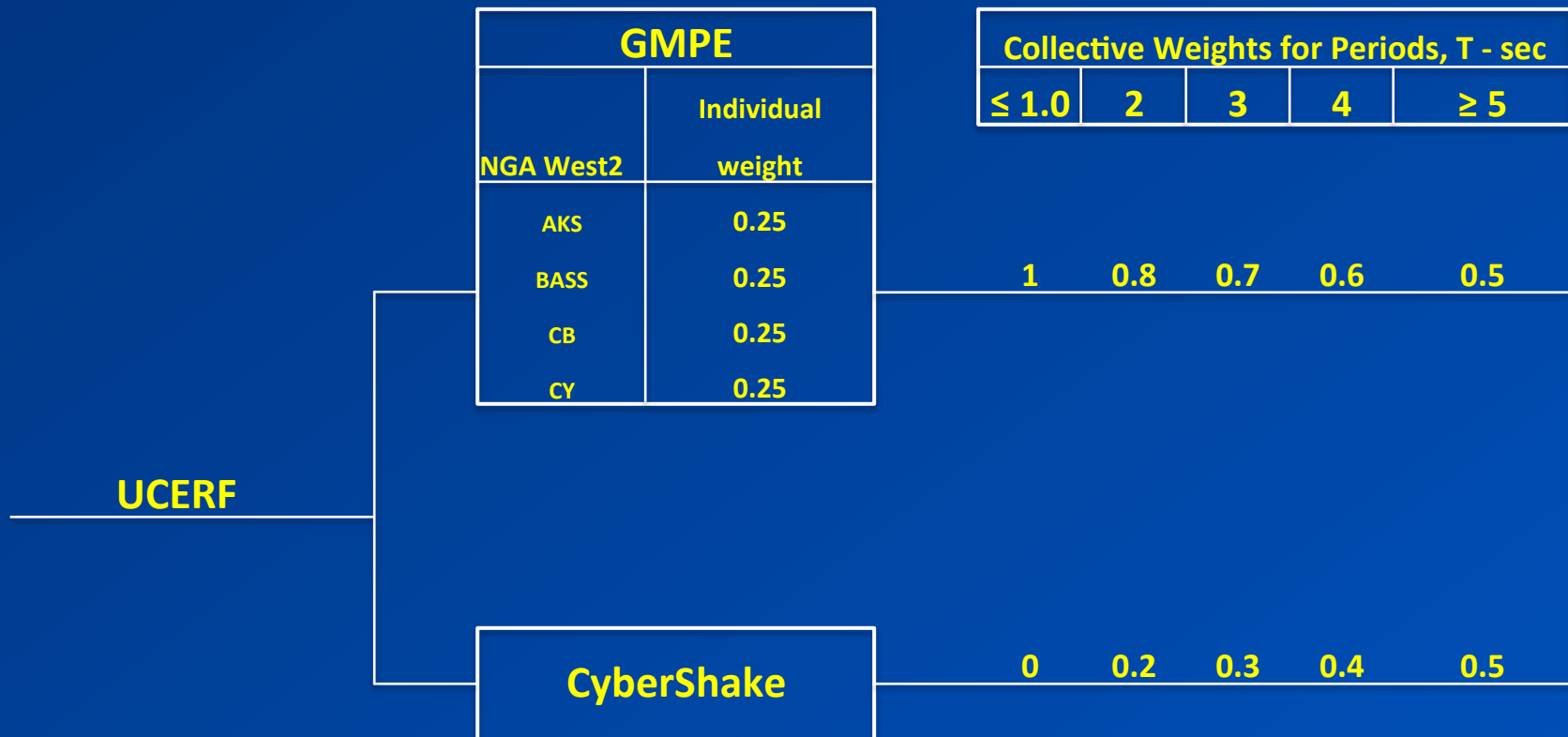
Weighted average

Logic Tree for PSHA/DSHA for MCER

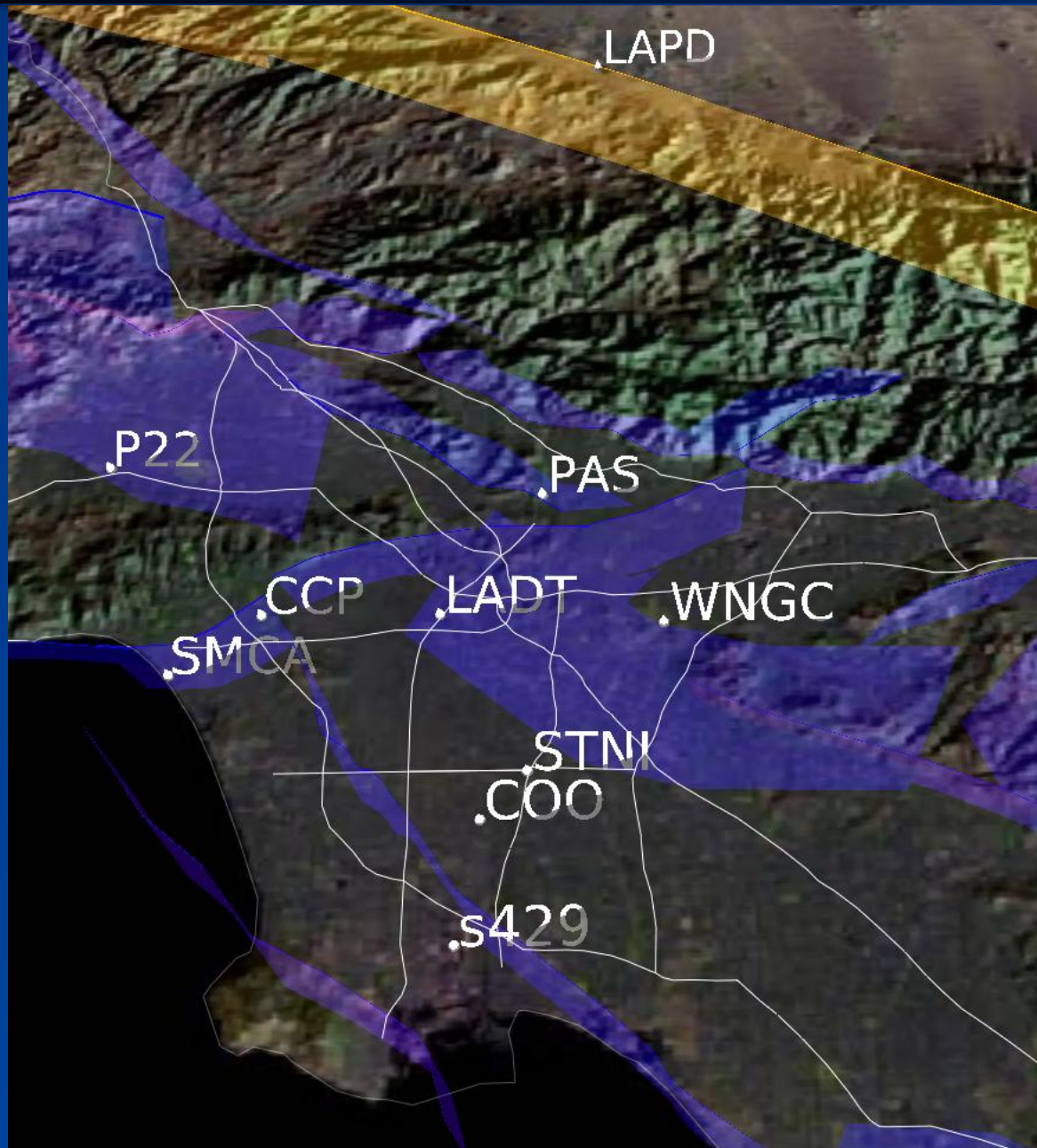
Source Model

G-M Models

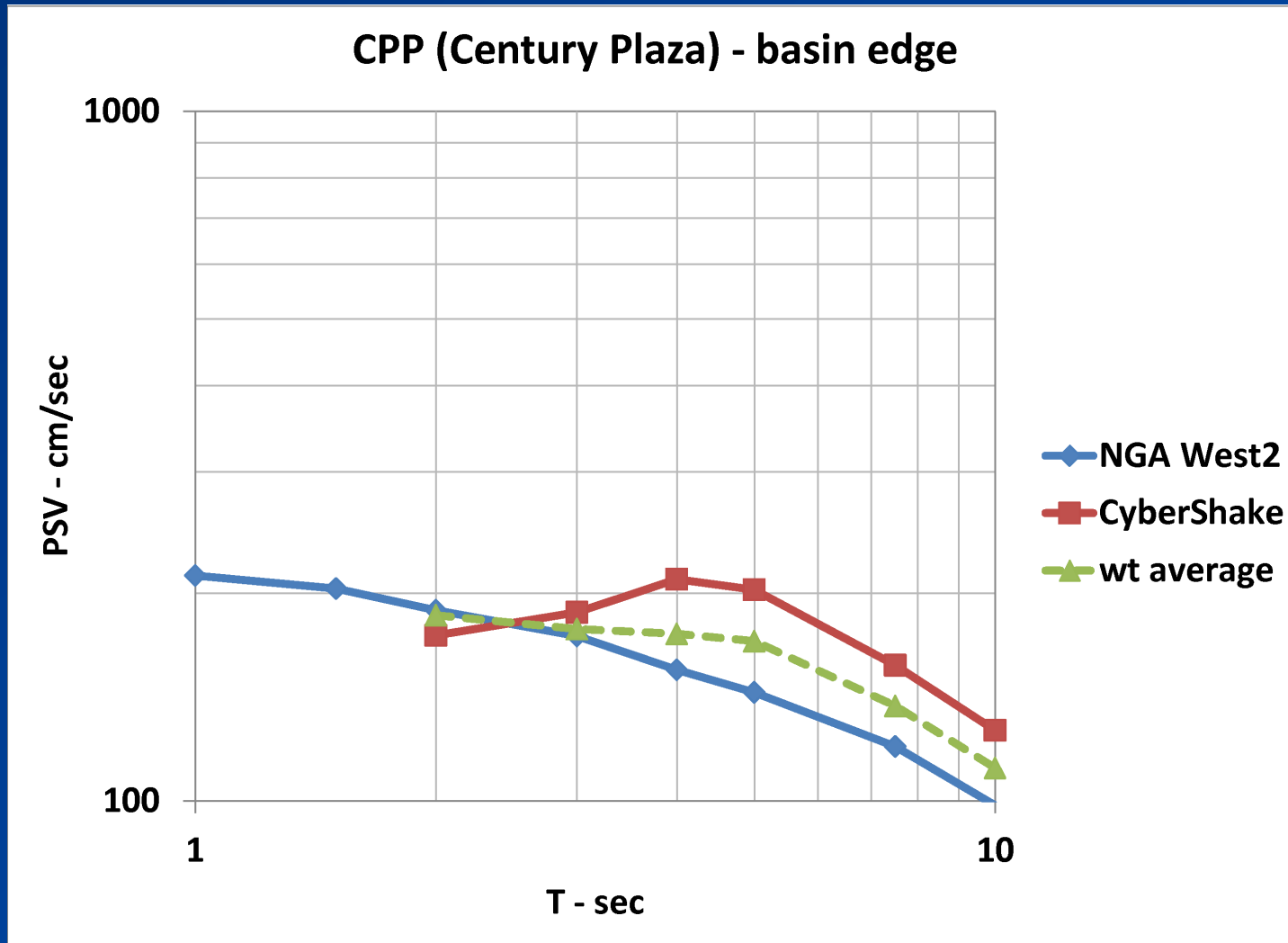
Weights



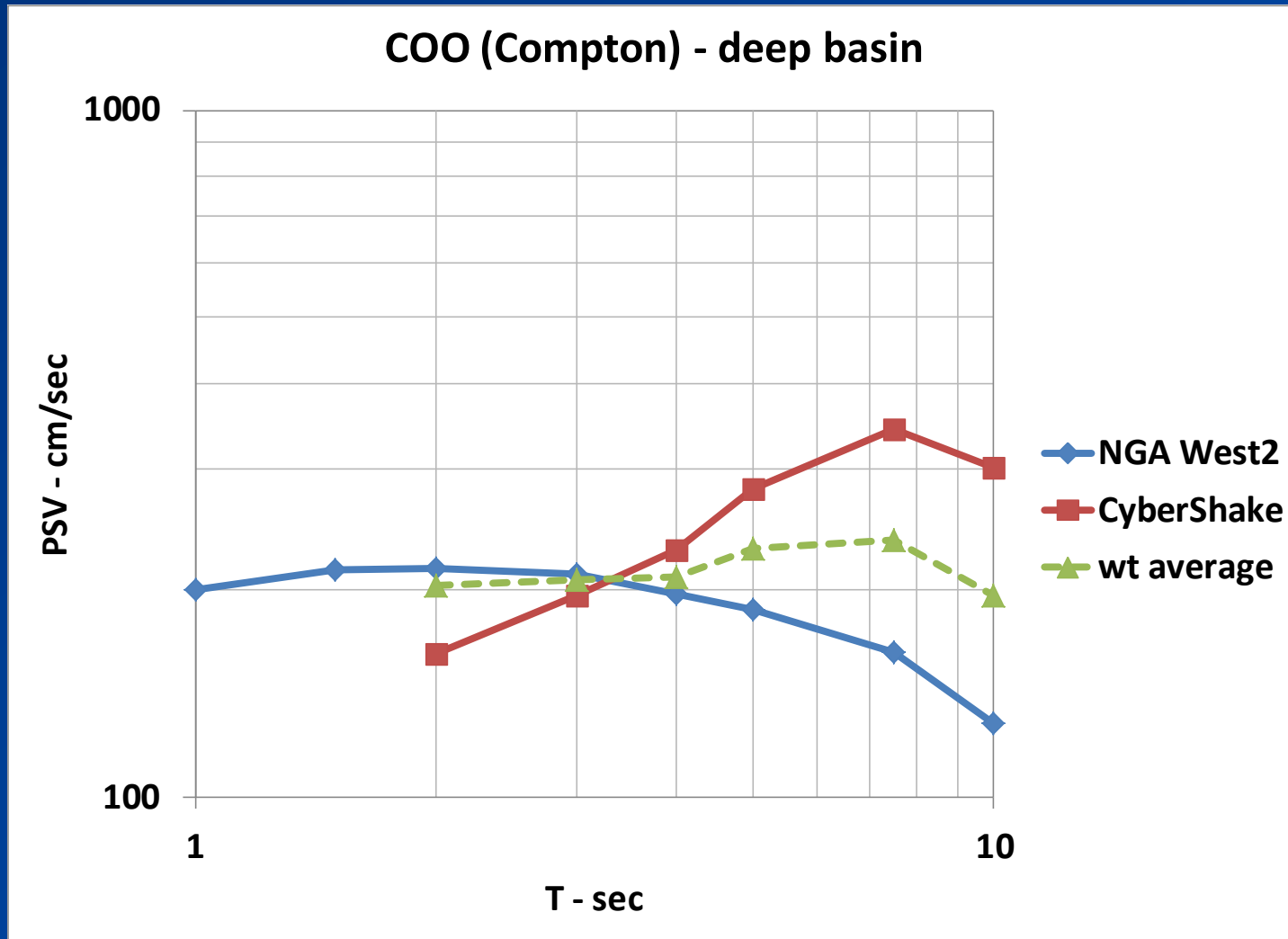
Los Angeles Sites



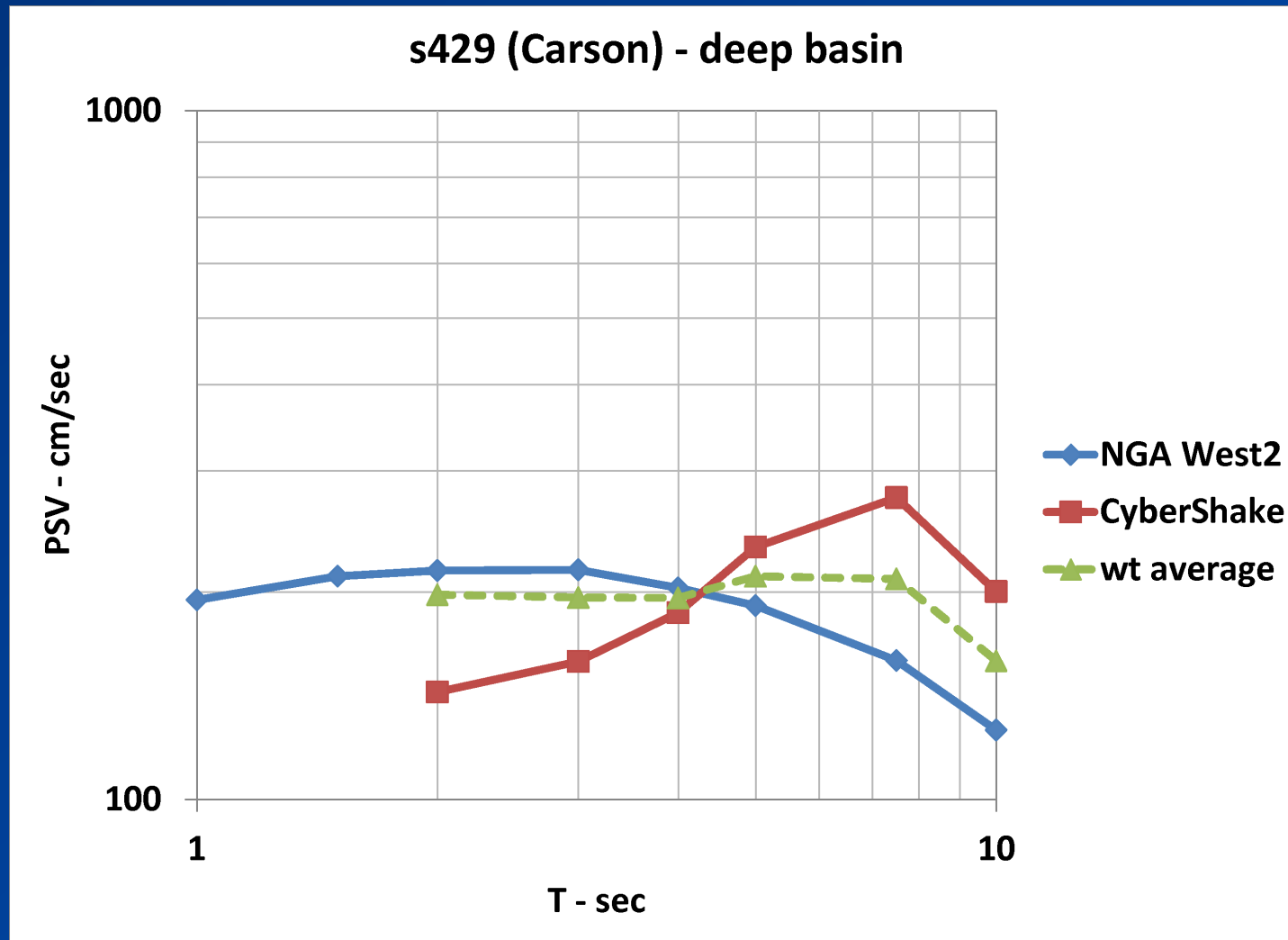
CPP MCE_R



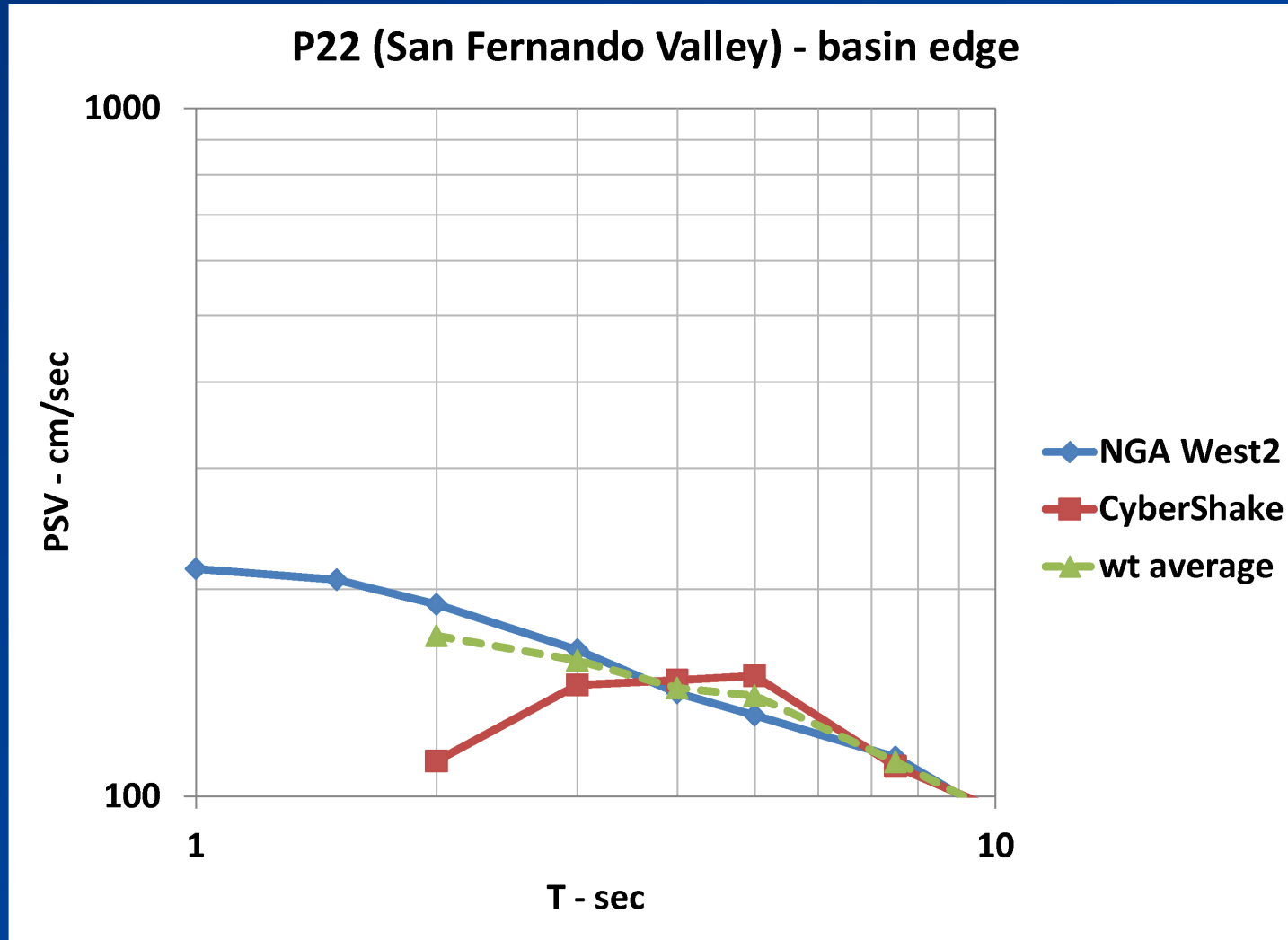
COO MCE_R



S429 MCE_R



P22 MCE_R



SCEC CyberShake Progress

- Broadband Calculations: $0.01 \leq T \leq 10$ sec
(Scott Callaghan)
- MCER at 14 sites: weighted average hazard curves
(Kevin Milner)