

CyberShake Hazard with the MUSCAL Velocity Model

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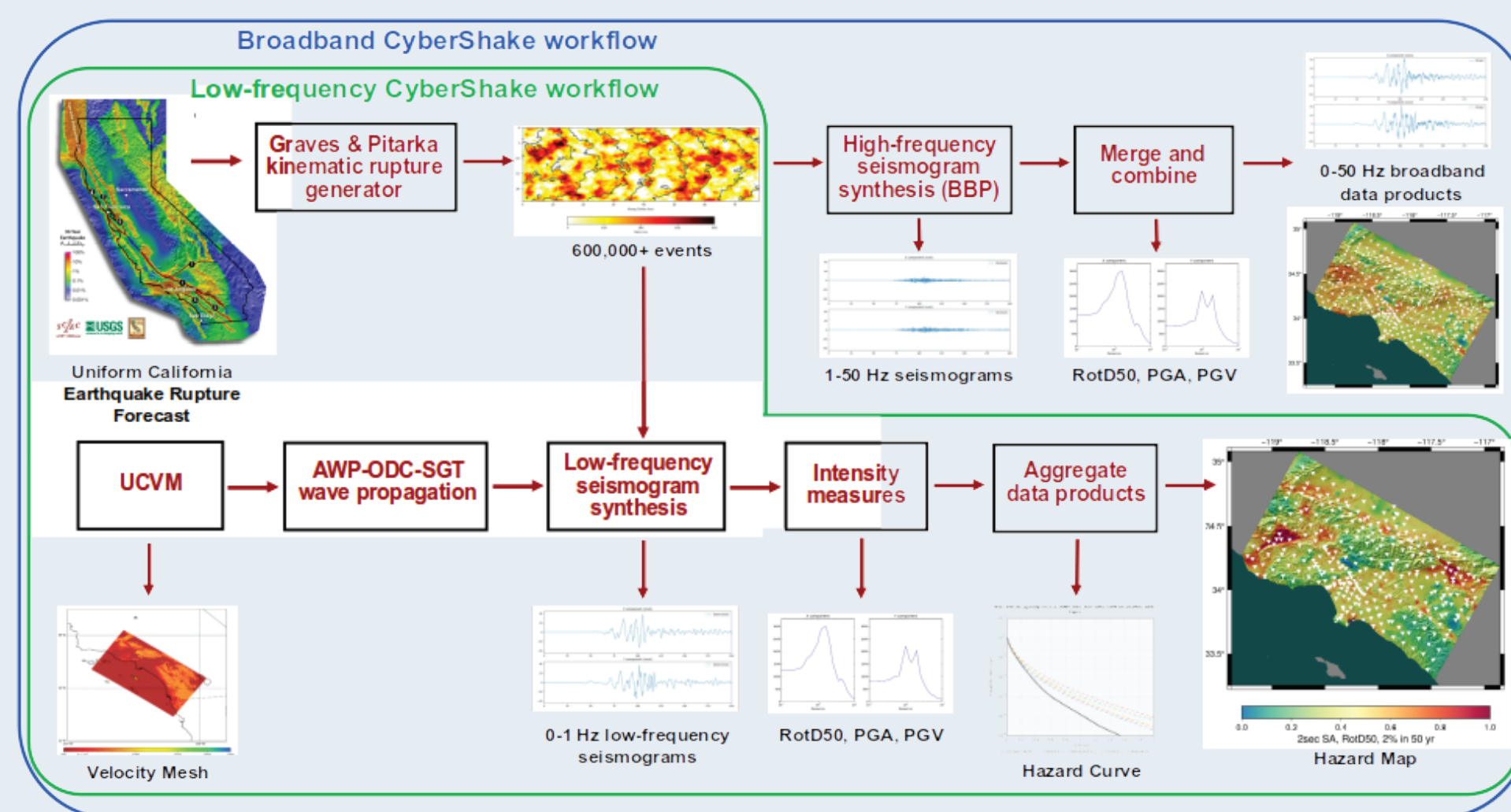


We have produced **CyberShake** seismic hazard products using the new 3D **MUSCAL** velocity model in both Northern and Southern California.

What is CyberShake?

CyberShake is SCEC's physics-based probabilistic seismic hazard analysis platform.

CyberShake computes PSHA by running 3D wave propagation simulations to determine ground motions, as illustrated in the figure below.



CyberShake produces a rich set of hazard data products, including seismograms, intensity measures, hazard curves, and hazard maps, available for community use.

Discussion

We calculated hazard at 10 sites in Southern (upper plots) and Northern California (lower plots) with MUSCAL (Yeh et al., 2026) and compared the results to previous CyberShake studies. At some sites, both hazard and site velocity profiles are similar (e.g. USC, SSFO). Other sites have substantial changes in hazard explained by changes in profiles (e.g. SBSM, LVMR). Additional sites show hazard changes not easily explained by changes in profiles (e.g. FFI, SJO).

We compared horizontal velocity model cross-sections (rightmost plots). The MUSCAL model has lower velocities in the Great Valley and Santa Maria Basin than the 22.12 model, and higher velocities in the Sierras than either other model. We also found that the 22.12 and 24.8 models have features with sharper edge transitions than MUSCAL, such as the Los Angeles Basin, the northern Great Valley, and the Sacramento Valley.

