Assessment of Community Velocity Models through the lens of Ground Motion Simulation Validation
CVM TAG and Workshops

There is or has been…

• substantial effort into development of CVM-H (15.1.0) and CVM-S (4.26);
• incremental improvements in CVM-H, but CVM-S is essentially frozen;
• development of a central California CCA CVM (version 6); and
• a UCVM framework to access these CMVs (Small et al., 2017).

The TAG goals are…

• to develop open methods for improving CVMs;
• to develop methods for CVM assessment and validation (including uncertainty); and
• to expand participation in work related to improving and utilizing CVMs.

To make further progress on these CVMs we need…

• open-source workflows to evaluate and/or update models;
• methods to merge models (of different resolution);
• strategies to integrate constraints from other geophysical, geotechnical, and geological sources; and
• methods for assessing model uncertainty.

The 2018 workshop objectives were…

• to assess the current status of CVMs;
• to define information needed to improve and/or develop CVMs;
• to propose workflow strategies for CVM development; and
• to identify approaches for assessing CVM uncertainties.

An essential next step was the formation of a TAG tasked with further developing and collectively carrying out coordinated activities to improve and validate CVMs.

This 2019 workshop objectives are…

• to reach final consensus on TAG mission and goals;
• to refine and prioritize the identified action items; and
• to coordinate plans for submission of proposals.
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Chino Hills
Validation with CVM-S4
Multiple CVMs
Multiple events and additional models (CVM-S4, CVM-S4.26.M01, CVM-H, CVM-H+GTL)
Some lessons or insights...
Z1.0 km for San Bernardino basin
Do they matter?
<table>
<thead>
<tr>
<th>Sim. ID</th>
<th>CVM-S</th>
<th>$V_{S\text{min}}$</th>
<th>Pts. per wavelength</th>
<th>$\alpha$ in $Q_s = aV_s$</th>
<th>$\lambda$ in $Q(f) = Q_0 f^\lambda$</th>
<th>Source</th>
<th>Magnitude</th>
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<td>200</td>
<td>10</td>
<td>50 (a)</td>
<td>0 (b)</td>
<td>0.8 (b)</td>
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<td>•</td>
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</table>

(a) This corresponds to the attenuation model BKT2, which is frequency independent.
(b) This corresponds to the attenuation model BKT3, which can be frequency dependent if $\lambda \neq 0$. 
CVM-S4.26.M01 vs. CVM-S4 (1@1 Hz CH-PS)

CVM-S4.26.M01 vs. CVM-S4 (1@4 Hz CH-ES)
Q as 100Vs vs. 50Vs (at 1 Hz for CH-PS)

BKT3 vs. BKT2 modeling (at 1 Hz for CH-PS)
Extended vs. point source (at 1 Hz for CH-PS)

Varying to Mw 5.5 vs. 5.4 (at 1 Hz for CH-PS)
200 m/s vs. 500 m/s (at 1 Hz for CH-PS)

10 PPWL vs. 20 PPWL (at 1 Hz for CH-PS)
...to many variables to look at
## Data Analysis Participation (in Percent) for Select Trees

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<tr>
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