

# Cybershake v20p4

"Scientific" Improvements

|                          | Functionality                                                       | To be included in this version                                                                                                                                                                                                                                              | Might be included | Not this version                                                                                     |
|--------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------------------------------------------------------------|
| <b>Velocity Model</b>    |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | Basin Modeling                                                      |                                                                                                                                                                                                                                                                             |                   | Add high priority basins                                                                             |
|                          | VM                                                                  | DEM extent increase + off-shore basin                                                                                                                                                                                                                                       |                   |                                                                                                      |
|                          | VM                                                                  | VM Size decreased based on depth of rupture - sim duration changed to account for surface arrival times                                                                                                                                                                     |                   |                                                                                                      |
| <b>Tectonics</b>         |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | Subduction                                                          | VMs with 3 cm/s PGV threshold.                                                                                                                                                                                                                                              |                   |                                                                                                      |
| <b>Simulation Method</b> |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | SRFgen improvements for shallow crustal earthquakes from validation | Prelim validation needs to be done                                                                                                                                                                                                                                          |                   |                                                                                                      |
| <b>LF</b>                |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | 200m simulation realisations                                        | For all faults                                                                                                                                                                                                                                                              |                   |                                                                                                      |
| <b>HF</b>                |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | Using Target dx/dy (stoch file more aligned with srf)               | for single segment ruptures                                                                                                                                                                                                                                                 |                   |                                                                                                      |
|                          | HF Scaling                                                          | HF DT decrease – using 0.01 for HF-DT, 0.005 for BB-DT                                                                                                                                                                                                                      |                   | Scale stoch dx/dy down with area of fault. (when reach X number of subfaults double the dx/dy value) |
|                          | Sim methodology improvements                                        | Using gmsim_v20.4.1                                                                                                                                                                                                                                                         |                   |                                                                                                      |
| <b>Stations</b>          |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | New Non-uniform Grid                                                | Update in Christchurch / Wellington Region<br>Finer Grid<br>Real station update<br>Only land stations in all versions of the grid (ref: <a href="#">Note s on lat,lon &lt;-&gt; x,y conversion</a> )<br>Similar number of stations<br><a href="#">Non Uniform Grid 20.3</a> |                   |                                                                                                      |
| <b>Vs30</b>              |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | vs30 improvements                                                   | Using geology only. Modified coastal areas with a distance to coast factor.                                                                                                                                                                                                 |                   |                                                                                                      |
| <b>Realisations</b>      |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | Additional Realisation Parameters (e.g. Magnitude)                  | Mw - Stress drop perturbation based on Leonard sigma and correlated together<br><br><a href="#">slip/rake/rise time perturbations come from the seed we pass to genslip</a><br><br>Shypo / Dhypo unchanged from last version                                                |                   |                                                                                                      |
|                          | Change SRF slip seed generation                                     | Randomised rather than same sequence                                                                                                                                                                                                                                        |                   |                                                                                                      |
| <b>Fault Sources</b>     |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |
|                          | ERF                                                                 |                                                                                                                                                                                                                                                                             |                   | Create custom ERF for cybershake run                                                                 |
|                          | Fault size rounding                                                 | Nearest 0.5k / 0.1k                                                                                                                                                                                                                                                         |                   |                                                                                                      |
|                          |                                                                     |                                                                                                                                                                                                                                                                             |                   |                                                                                                      |