Outline

This page provides rough outlines on the current progress on Cybershake in NZ.

Note that his page is for internal sharing purposes only, it is likely inaccurate and out-of-date, and therefore it is advised to conduct researchers directly if you want more reliable information

Version	Num sources	SRF generation	VM domain	VM generation	Simulation specs	Recording stations	Estimated core-hours	Actual core hours	Notes
v17.8	15 (dominant in Canterbury)	3 hypo and 2 slip dist per source	automated based on PGV>5cm/s; 15kmRup, 5km land cutoff Default depth and duration scaling	0.4km regular grid, Vs_min=500	Transition freq = 0.25Hz	19,604 (virtual + Geonet stations)	~3k Fitzroy		First implementation; Focus on running workflow and comparison with empirically-derived hazard curves
v17.9 + v18p4	~ (South Island)	hypo every 20 km along strike, 3 slip dist per source	as v17.8	as for v17.8	as for v17.8	19,604 (virtual + Geonet stations)	-- hours on Kupe		Focus on extending number off sources and srf uncertainties
v18.5	251 North Island faults	Same as v17.9	as for v17.9	as for v17.9	as for v17.9	19,604 (virtual + Geonet stations)	-- hours on Kupe		Running for the North Island sources to merge with 18p4 (and 17p9) to have a nation-wide hazard results
v18p6	483 sources across NZ	Magnitude-dependantnumber of realizations one slip distribution per hypocentre Leonard magnitude scaling	Pgv threshold of 2 cm /s	as for v17.9	as for v17.9	27,481 (virtual + Geonet stations)	150 k on Kupe		• Monte Carlo hypocentre realizations • Variation in hypocentre location along the strike and dip directions
v19p5	472 sources across NZ (removed some due to land VM area / DEM)	Same as v18p6	Same as v18p6	as for v17.9	as for v17.9	same as v18p6		700k CH on maui	New gmsim version. Specifically changes in HF Updated to Kevin's 19p1 vs30 model
v20p4	478 sources across NZ	Magnitude-dependantnumber of realizations one slip distribution per hypocentre leonard magnitude scaling + monte carlo magnitude uncertanity	2 cm/s DEM extent increase + off-shore basin VM Size decreased based on depth of rupture sim duration changed to account for surface arrival times 2.03	as for v17.9	as for v17.9 HF DT 0.01 upsampling to 0.005 for BB	25948 (virtual + Geonet stations)		230k CH on maui	
v20p5	8 Subduction Sources across NZ	same as v20p4	same as v20p4 with: Reduced PGV threshold to 3 cm/s	as for v17.9	as for v17.9	Same as v20p4		170k CH on maui	
v20p6	same as v20p4	same as v20p4	same as v20p4	0.2 km regular grid vsmin 0.5	Transition Freq 0.5Hz	Same as v20p4			
v20p9	Same as v20p5	same as v20p4	same as v20p5	same as v20p6	same as v20p6	same as v20p4			

v21p1+v21 p6		same as v20p4	same as v20p4 + VM perturbations per realisation	0.1 km regular grid, vsmin 0.5	Transition Freq 1Hz	Same as v20p4			

To do list:

Refer to this sub-page for the list of to-do items for Cyberhshake:

Cybershake to-do list

Ideas for future implementations (no particular order):

- Bootstrap sampling to understand how many ruptures are needed for a given source
- Source uncertainties (currently slip and hypo; but need to add uncertainty in G&P parametrization).
- Velocity model uncertainties (random pertubations).
- Explicit modelling of subduction zone sources in Cybershake
- Neural Net for GMM trained with CS and validation results in order to use for distributed seismicity
- New velocity model (i.e. with more basins)
- Velocity model with tomographic refinement
- Velocity model with site-specific 1D for HF method
- Logic tree for hazard to consider different ground motion models (both empirical and simulated). Weights for models are determined based on a neural net fit to the data in which all models start with uniform weight and the weights are then determined as a function of site location, magnitude, source to site distance etc. Location component can be part of a convNet.
- Ongoing improvements to the simulation code (topo, plasticity etc)
- Paper which shows the theoretical benefits of forward simulation and domain optimization in terms of minimum total computation vs. recriprocity.
- Consider other ERFs (i.e. not just Stirling et al 2012); UCERF3 method applied to NZ; RSQSim applied to NZ.
- Extraction of deagg, and gm selection for a conditional IM hazard/im value.