

Real-time Ground Motion Simulation Setup

This guide is for someone who would like to run a simulation with current library and packaging.

Step-by-step guide

1. How to create a working folder

1. Get the current working version of gm_sim_pkg by using git clone:

```
$ git clone git@github.com:ucgmsim/gm_sim_pkg.git
```

2. Navigate into gm_sim_pkg directory and download the latest package from the FTP server: https://quakecoresoft.canterbury.ac.nz/seisfinder/private/gmsim/gmsim_pack_latest.tar.gz

```
$ wget https://quakecoresoft.canterbury.ac.nz/seisfinder/private/gmsim/gmsim_pack_latest.tar.gz
```

3. Use install.sh to install the package just downloaded in the following format:

```
./install.sh gmsim_pack_latest.tar.gz [event_date] [event_location] [event_magnitude]
```

```
$ ./install.sh gmsim_pack_latest.tar.gz 20100904 Darfield 7.1
```

4. This starts the installation process.

```

=====
Event Name: 20100904_Darfield_m7p1
Run Name: 20100904_Darfield_m7p1_201705221509
Package to be installed: /home/jonney/gm_sim_pkg/gmsim_pack_20170522_1443.tar.gz
Run directory: /home/jonney/20100904_Darfield_m7p1_201705221509
=====
Do you wish to proceed? (Y/N) y
=====
Creating directory structure
=====
/home/seb56/tmp already exists.
/nesi/projects/nesi00213/RealTime/code already exists.
=====
Extracting the package
=====
./
./code/
./code/wrapper/
./code/wrapper/setup_remote.sh
./code/wrapper/make_vm.sh
./code/wrapper/make_stat.sh...
./GM/Sim/
./GM/Sim/Data/
./GM/Sim/Figures/
./Stat/
=====
Updating the data
=====
From https://github.com/ucgmsim/vm_data
* branch master -> FETCH_HEAD
Already up-to-date.
=====
Final touch
=====
>>> Moving to /home/jonney/code from /home/jonney/20100904_Darfield_m7p1_201705221509/code
>>> Updating vs30-mapping data
location: /home/jonney/code/Vs30-mapping
collecting md5sum for file check
Existing KRIGE_NZGD00_allNZ.Rdata is already good: No need to update
>>> Making a symbolic link to /home/jonney/tmp/vm_data/Data
>>> Writing gmsim.cfg
=====
Done!!!!
=====

```

5. This has created the directory structure for managing the ground motion simulation for 2010 September 4 Darfield earthquake (Mw7.1)

```

20100904_Darfield_m7p1_201705221509/
GM
  Obs
    Data
    Figures
  Sim
    Data
    Figures
  Validation
    Data
    Figures
Impact
  Landslide
  PAGER
Src
  Data
  Figures
  Model
Stat
VM
  Data
  Figures
  Model
Velocity-Model
Data -> /home/jonney/tmp/vm_data/Data

```

6. Follow the instruction shown on screen to create required Models and files.

```

Instructions:
Everyone: !!!!!!!!!!!!!!! source /home/jonney/20100904_Darfield_m7p1_201705221509/path.sh !!!!!!!!!!!!!!!
VM: 1. cd /home/jonney/20100904_Darfield_m7p1_201705221509/VM
2. config_vm.py mag centroidDepth lon lat
3. test_vm_params.py (if params_vel.py edited)
4. make_vm.sh
Source: 1. cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src
2. config_src.py
3. make_src.sh
Obs: 1. cd /home/jonney/20100904_Darfield_m7p1_201705221509/GM/Obs
2. config_obs.py geoNet_ftp_url
3. make_obs.sh

```

!!! Before you move on, make sure you do the first line give in the instruction. !!!

```
$ source /home/jonney/20100904_Darfield_m7p1_201705221509/path.sh
```

2. How to create a Velocity Model

1. Go to the VM directory that instruction has provided

```
$ cd /home/jonney/20100904_Darfield_m7p1_201705221509/VM
```

2. Execute config_vm.py to generate params_vel.py, a config file used for velocity modelling. The command is in the following format.

```
$ config_vm.py magnitude centroid_Depth Latitude Longitude
```

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM : config_vm.py -h
usage: config_vm.py [-h] [--model_version MODEL_VERSION] [--min_vs MIN_VS]
                  [--topo_type TOPO_TYPE] [--hh HH]
                  [--extent_zmin EXTENT_ZMIN] [--extent_x EXTENT_X]
                  [--extent_y EXTENT_Y] [--extent_zmax EXTENT_ZMAX]
                  [--sim_duration SIM_DURATION] [--flo FLO] [--rot ROT]
                  [--code CODE] [--output_dir OUTPUT_DIR]
                  [--slice_params_dir SLICE_PARAMS_DIR]
                  mag centroidDepth lon lat
positional arguments:
  mag
  centroidDepth
  lon
  lat
optional arguments:
  -h, --help            show this help message and exit
  --model_version MODEL_VERSION
  --min_vs MIN_VS
  --topo_type TOPO_TYPE
  --hh HH
  --extent_zmin EXTENT_ZMIN
  --extent_x EXTENT_X
  --extent_y EXTENT_Y
  --extent_zmax EXTENT_ZMAX
  --sim_duration SIM_DURATION
  --flo FLO
  --rot ROT
  --code CODE
  --output_dir OUTPUT_DIR
  --slice_params_dir SLICE_PARAMS_DIR

```

Three parameters mag, centroidDepth, lon, lat are mandatory. You can set other options with --option, such as --hh 0.2 or manually set by editing params_vel.py

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM : config_vm.py 7.1 46.00 172.3 -43.6 --hh 0.2 --rot
-10 --extent_x 140 --extent_y 120 --extent_zmax 46.0 --sim_duration 100
mag = 7.1 centroidDepth = 46.0 lon= 172.3 lat = -43.6
##### Generated params_vel.py

# If you edited this file manually, run 'test_vm_params.py' for integrity check !!!
# Section I. Basic parameters (Manual Edit allowed)
mag = '7.1'
centroidDepth = '46.00'
MODEL_LAT = '-43.6'
MODEL_LON = '172.3'
MODEL_ROT = '-10.0'
hh = '0.200'
min_vs = '0.5'
model_version = '1.65'
topo_type = 'BULLDOZED'
output_directory = 'Rapid_Model'
extracted_slice_parameters_directory = 'SliceParametersNZ/SliceParametersExtracted.txt'
code = 'rt'
# Section II. Derived parameters that can be manually edited
extent_x = '140.0'
extent_y = '120.0'
extent_zmax = '46.0'
extent_zmin = '0.0'
sim_duration = '100.0'
flo = '0.5'
# Section III. Automated values. DO NOT EDIT (Manual changes will be ignored)
nx = '700'
ny = '600'
nz = '230'
sufx = '_rt01-h0.200'
##### Estimated Wallclock time
nx=700 ny=600 nz=230 sim_duration=100 num_procs=512
Maximum: 0:55:02
Average: 0:17:16.597834
Minimum: 0:11:58.613082

```

3. You can manually edit params_vel.py. But you are **strongly advised** to run test_vm_params.py to validate your params_vel.py if manually edited. Note that values in Section II will be automatically computed based on the values in Section I, but user can manually edit them. However, any manual changes made to Section III will be ignored. In the example, we execute test_vm_params.py after manually editing the value for "code" from "rt" to "nz". This creates new params_vel.py after making a backup of the original, and shows the difference between two. Notice "|" where a difference is observed (line 30).

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM :test_vm_params.py
##### Backing up params_vel.py to params_vel.py.bak
##### params_vel.py updated
diff -y params_vel.py.bak params_vel.py
# If you edited this file manually, run 'test_vm_params.py' f # If you edited this file manually, run
'test_vm_params.py' f
# Section I. Basic parameters (Manual Edit allowed) # Section I. Basic parameters (Manual
Edit allowed)
mag = '7.1' mag = '7.1'
centroidDepth = '46.00' centroidDepth = '46.00'
MODEL_LAT = '-43.6' MODEL_LAT = '-43.6'
MODEL_LON = '172.3' MODEL_LON = '172.3'
MODEL_ROT = '-10.0' MODEL_ROT = '-10.0'
hh = '0.200' hh = '0.200'
min_vs = '0.5' min_vs = '0.5'
model_version = '1.65' model_version = '1.65'
topo_type = 'BULLDOZED' topo_type = 'BULLDOZED'
output_directory = 'Rapid_Model' output_directory = 'Rapid_Model'
extracted_slice_parameters_directory = 'SliceParametersNZ/Sli extracted_slice_parameters_directory =
'SliceParametersNZ/Sli
code = 'nz' code = 'nz'
# Section II. Derived parameters that can be manually edited # Section II. Derived parameters that
can be manually edited
extent_x = '140.0' extent_x = '140.0'
extent_y = '120.0' extent_y = '120.0'
extent_zmax = '46.0' extent_zmax = '46.0'
extent_zmin = '0.0' extent_zmin = '0.0'
sim_duration = '100.0' sim_duration = '100.0'
flo = '0.5' flo = '0.5'
# Section III. Automated values. DO NOT EDIT (Manual changes # Section III. Automated values. DO NOT
EDIT (Manual changes
nx = ' 700' nx = ' 700'
ny = ' 600' ny = ' 600'
nz = '230' nz = '230'
sufx = '_rt01-h0.200' | sufx = '_nz01-h0.200'

##### Estimated Wallclock time
nx=700 ny=600 nz=230 sim_duration=100 num_procs=512
Maximum: 0:55:02
Average: 0:17:16.597834
Minimum: 0:11:58.613082

```

4. Run make_vm.sh to create the Velocity Model

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM :make_vm.sh
Executing genDomain.py
Reading domain extents.
Reading of domain extents. Complete.
Writing generate velocity model shell scrip.
Writing generate velocity model shell scrip. Complete.
Generating velocity model.
=====
Running GENERATE_VELOCITY_MOD.
=====
...
Completed running GENERATE_VELOCITY_MOD.
=====
...
Running EXTRACT_VELOCITY_SLICES.
=====
...
Completed running EXTRACT_VELOCITY_SLICES.
=====
...
/nesi/projects/nesi00213/tools/gen_model_cords geoproj=1 gridfile=./Rapid_Model/Rapid_Model
/Velocity_Model/gridfile_nz01-h0.200 gridout=./Rapid_Model/Rapid_Model/Velocity_Model/gridout_nz01-h0.
200 center_origin=1 do_coords=1 nzout=1 name=./Rapid_Model/Rapid_Model/Velocity_Model/model_coords_nz01-
h0.200 gzip=0 latfirst=0 modellon=172.3 modellat=-43.6 modelrot=-10.0 1> ./Rapid_Model/Rapid_Model
/Velocity_Model/model_params_nz01-h0.200 2>/dev/null
Generating model params and cords. Complete.
Moving velocity model plots.
Moving velocity model plots. Complete.
Removing generated scripts.
Rapid model generation complete.
Model/20100904_Darfield_m7p1/v1.65_200m
!!!! Ask Admin to upload: Give him the path: /home/jonney/20100904_Darfield_m7p1_201705221509/VM !!!!

```

5. Under the working directory VM, a subdirectory is created Model/20100904_Darfield_m7p1/v1.65_200m which contains the velocity model.

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM/Model/20100904_Darfield_m7p1/v1.65_200m :ls
gridfile_nz01-h0.200  Info                                model_coords_nz01-h0.200  params_vel.py  vp3dfile.p
gridout_nz01-h0.200  model_bounds_nz01-h0.200  model_params_nz01-h0.200  rho3dfile.d   vs3dfile.s

```

6. Give the admin (Sung) the path to the VM working directory and request to upload the model. The admin will need to execute sendme.sh in the VM directory.

```

/home/jonney/20100904_Darfield_m7p1_201705221509/VM/sendme.sh
SCP Upload tool
Establishing SSH connection to: fitzroy.nesi.org.nz 22 ...
Node size : 4
*****
/home/nesi00213...del/20100904_Darfield_m7p1/v1.65_200m/Info                                49 Bytes Completed
/home/nesi00213...904_Darfield_m7p1/v1.65_200m/params_vel.py                            756 Bytes Completed
/home/nesi00213...d_m7p1/v1.65_200m/model_params_nz01-h0.200                          381 Bytes Completed
/home/nesi00213...field_m7p1/v1.65_200m/gridfile_nz01-h0.200                         155 Bytes Completed
/home/nesi00213...d_m7p1/v1.65_200m/model_bounds_nz01-h0.200                         96.3 KiB Completed
/home/nesi00213...rfield_m7p1/v1.65_200m/gridout_nz01-h0.200                         52.4 KiB Completed
/home/nesi00213...d_m7p1/v1.65_200m/model_coords_nz01-h0.200                         15.2 MiB Completed
/home/nesi00213...100904_Darfield_m7p1/v1.65_200m/vs3dfile.s                         368.5 MiB Completed
/home/nesi00213...00904_Darfield_m7p1/v1.65_200m/rho3dfile.d                         368.5 MiB Completed
/home/nesi00213...100904_Darfield_m7p1/v1.65_200m/vp3dfile.p                         368.5 MiB Completed
Node 1: /home/nesi00213...100904_Darfield_m7p1/v1.65_200m/vs3dfile.s                 368.5 MiB/368.5 MiB 100.0%
Node 2: /home/nesi00213...00904_Darfield_m7p1/v1.65_200m/rho3dfile.d                 368.5 MiB/368.5 MiB 100.0%
Node 3: /home/nesi00213...100904_Darfield_m7p1/v1.65_200m/vp3dfile.p                 368.5 MiB/368.5 MiB 100.0%

```

7. Files have been successfully uploaded to Fitzroy.

Bash_code

```
baes@nesi2 /nesi/projects/nesi00213/VelocityModels/NZ/20100904_Darfield_m7p1/v1.65_200m :ls
Info          gridout_nz01-h0.200          model_coords_nz01-h0.200  params_vel.py  vp3dfile.p
gridfile_nz01-h0.200  model_bounds_nz01-h0.200  model_params_nz01-h0.200  rho3dfile.d   vs3dfile.s
```

3. How to create Rupture Model (Source)

1. Go to the Src directory that instruction has provided

```
$ cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src
```

2. Create the config file that is needed for generating a Rupture Model

```
$config_src.py -h
usage: config_src.py [-h] {1,2,3,4} ...
positional arguments:
  {1,2,3,4}  Choose the type of srf you want to generate, usage of each type
            use: gen_src_params.py type -h
            1  Generate type 1 srf (Point source srf).
            2  Generate type 2 srf (Point source to Finite Fault srf).
            3  Generate type 3 srf (Finite Fault descriptor to Finite Fault
                srf).
            4  Generate type 4 srf (Multiple Segment Finite Fault srf).
optional arguments:
  -h, --help  show this help message and exit
```

The extra options may differ from type to type. Use: "config_src.py type -h" will show you all the options can be provided for that type of source.

example of showing options for type 2:

```
$ config_src.py 2 -h
usage: config_src.py 2 [-h] [--LAT [LAT]] [--LON [LON]] [--MAG [MAG]]
                      [--STK [STK]] [--RAK [RAK]] [--DIP [DIP]] [--DT [DT]]
                      [--DEPTH [DEPTH]] [--SEED [SEED]] [--RVFRAC [RVFRAC]]
                      [--ROUGH [ROUGH]] [--SLIP_COV [SLIP_COV]]
                      [--MWSR [MWSR]] [--STOCH [STOCH]] [--GENSLIP [GENSLIP]]
                      [--PREFIX [PREFIX]]

optional arguments:
  -h, --help            show this help message and exit
  --LAT [LAT]           latitude (float)
  --LON [LON]           longitude (float)
  --MAG [MAG]           magnitude (float)
  --STK [STK]           strike (int)
  --RAK [RAK]           rake (int)
  --DIP [DIP]           dip (int)
  --DT [DT]            rupture timestep
  --DEPTH [DEPTH]
  --SEED [SEED]
  --RVFRAC [RVFRAC]
  --ROUGH [ROUGH]
  --SLIP_COV [SLIP_COV]
  --MWSR [MWSR]         Mw Scaling Relation (string), one
                        of:HanksBakun2002,BerrymanEtAl2002,VillamorEtAl2001
  --STOCH [STOCH]       String to set stoch gener ation. Default vaule will be
                        used if not specified
  --GENSLIP [GENSLIP]   Version of genslip
  --PREFIX [PREFIX]     The prefix you want for SRF files. default= source.
                        Ending with _ will auto append extra info to file
                        name. Default value will be used if not specified.
```

And example of creating type 2 Source file:

```
$ config_src.py 2 --LAT -43.6 --LON 172.3
TYPE = 2
LAT = -43.6
LON = 172.3
PREFIX = Srf/source
SEED = 103245
STOCH = Stoch
GENSLIP = 3.3
#####
the params below are not specified, please manually edit setSrfParams.py to specify the value.
#####
MAG =
STK =
RAK =
DIP =
DT =
RVFRAC =
ROUGH =
SLIP_COV =
DEPTH =
MWSR =
=====
Cannot find folder /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1.
Attemp to create...
Created Folder: /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1
no existing folder with type 2,
Using sub-folder name: t2_103245
#####
Please go to:
cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1/t2_103245
to manually edit all the parameters that is empty in setSrfParams.py and run make_src.sh
#####
```

If config_src.sh has been run more than once, it will ask you if you want to update/replace a current param or create a new one.

You can choose to create a new sub-folder with time stamp or replace the old files.

example of creating new folder:

```

$ config_src.py 2 --LAT -43.6 --LON 172.3 --MAG 7.1 --STK 150.0 --RAK 6.0
TYPE = 2
LAT = -43.6
LON = 172.3
MAG = 7.1
STK = 150.0
RAK = 6.0
PREFIX = Srf/source
SEED = 103245
STOCH = Stoch
GENSLIP = 3.3
#####
the params below are not specified, please manually edit setSrfParams.py to specify the value.
#####
DIP =
DT =
RVFRAC =
ROUGH =
SLIP_COV =
DEPTH =
MWSR =
=====
select the src folder you want to place the setSrfParams.py into
=====
1. Create new setSrfParams.py
2. t2_103245
Enter the number you wish to select (1-2):1
=====
Do you want to create a sub-folder: t2_103245_20170524_171346?
=====
1. Yes
2. No
Enter the number you wish to select (1-2):1
#####
Please go to:
cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/220100904_Darfield_m7p1
/t2_103245_20170524_171346
to manually edit all the parameters that is empty in setSrfParams.py and run make_src.sh
#####

```

If you choose to replace existing params, it will show a comparison between two params(old on the left, new on the right).
Example of replacing a old param file:

```

$ config_src.py 2 --LAT -43.6 --LON 172.3 --MAG 7.1 --STK 1.0 --RAK 1.0 --DT 0.025
TYPE = 2
LAT = -43.6
LON = 172.3
MAG = 7.1
STK = 1.0
RAK = 1.0
DT = 0.025
PREFIX = Srf/source
SEED = 103245
STOCH = Stoch
GENSLIP = 3.3
#####
the params below are not specified, please manually edit setSrfParams.py to specify the value.
#####
DIP =
RVFRAC =
ROUGH =
SLIP_COV =
DEPTH =
MWSR =
=====
=====

```

select the src folder you want to place the setSrfParams.py into

```
=====
1. Create new setSrfParams.py
2. t2_103245
3. t2_103245_20170524_171346
Enter the number you wish to select (1-3):2
diff -y /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1/t2_103245
/setSrfParams.py /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p/params.
tmp
## Sets Variables for SRF/Stoch Generation                                ## Sets Variables for SRF/Stoch
Generation                                                                Generation
#####                                                                    #####
#!!!Important!!                                                         #!!!Important!!
#####                                                                    #####
#Please change the values accordingly if '#!!!PLEASE SPECIFY!           #Please change the values
accordingly if '#!!!PLEASE SPECIFY!

# TYPE:                                                                    # TYPE:
# 1: point source to point source srf                                    # 1: point source to point source
srf                                                                        # 2: point source to finite fault
# 2: point source to finite fault srf                                    srf
# 3: finite fault to finite fault srf                                    # 3: finite fault to finite fault
srf                                                                        # 4: multi-segment finite fault srf
# 4: multi-segment finite fault srf                                     TYPE = 2
TYPE = 2                                                                    # specify basename for gsf, srf and stoch file created
# specify basename for gsf, srf and stoch file created                  and stoch file created
# PREFIX for gsf/srf/stoch files                                         # PREFIX for gsf/srf/stoch files
# if prefix ends with '_', automatic naming follows                     # if prefix ends with '_', automatic
PREFIX = 'Srf/source'                                                       PREFIX = 'Srf/source'
# directory for Stoch file(s)                                             # directory for Stoch file(s)
# set to None to not produce the stoch file                             # set to None to not produce the
stoch file                                                                STOCH = 'Stoch'
STOCH = 'Stoch'                                                            # rupture timestep (float), e.g. DT =
# rupture timestep (float), e.g. DT = 0.025                             0.025
DT = #!!!PLEASE SPECIFY!!!#                                                |      DT = 0.025
# latitude (float), e.g. LAT = -43.5095                                  # latitude (float), e.g. LAT =
-43.5095                                                                    LAT = -43.6
LAT = -43.6                                                                # longitude (float), e.g. LON = 172.1811
# longitude (float), e.g. LON = 172.1811                                  LON = 172.3
LON = 172.3                                                                ...
...
SEED = 103245                                                                SEED = 103245
# Mw Scaling Relation (string), one of:                                  # Mw Scaling Relation (string),
one of:                                                                    # HanksBakun2002, BerrymanEtAl2002,
# HanksBakun2002, BerrymanEtAl2002, VillamorEtAl2001                  VillamorEtAl2001
VillamorEtAl2001                                                            MWSR = '#!!!PLEASE SPECIFY!!!#
MWSR = '#!!!PLEASE SPECIFY!!!#

=====
do you want to replace this param file?
=====
1. Yes
2. No
Enter the number you wish to select (1-2):1
#####
Please go to:
cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1/t2_103245
to manually edit all the parameters that is empty in setSrfParams.py and run make_src.sh
#####
```

3. Go to the folder provided by instructions

```
$ cd /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1/t2_103245
```

4. Edit the setSrfParams.py

note: every variables with **####PLEASE SPECIFY####** must be provided

```
$ vim setSrfParams.py

1 ## Sets Variables for SRF/Stoch Generation
2 #####
3 ###Important!!
4 #####
5 #Please change the values accordingly if '####PLEASE SPECIFY####'
6
7 # TYPE:
8 # 1: point source to point source srf
9 # 2: point source to finite fault srf
10 # 3: finite fault to finite fault srf
11 # 4: multi-segment finite fault srf
12 TYPE = 2
13 # specify basename for gsf, srf and stoch file created
14 # PREFIX for gsf/srf/stoch files
15 # if prefix ends with '_', automatic naming follows
16 PREFIX = 'Srf/source'
17 # directory for Stoch file(s)
18 # set to None to not produce the stoch file
19 STOCH = 'Stoch'
20 # rupture timestep (float), e.g. DT = 0.025
21 DT = 0.025
22 # latitude (float), e.g. LAT = -43.5095
23 LAT = -43.6
24 # longitude (float), e.g. LON = 172.1811
25 LON = 172.3
26 # depth (float), ex. DEPTH = 2.0
27 DEPTH = 2.0####PLEASE SPECIFY####
28 # magnitude (float), e.g. MAG = 5.5
...
...
40 ## roughness of fault only for genslip 5.0+
41 ## 0.1 is a good value to use - Rob Graves
42 ## 0.0050119 = (10^(-2.3)) - Shi & Day 2014. Used as default in 5.2.3a
43 #ROUGH = ####PLEASE SPECIFY####
44 ## (float), e.g. RVFRAC = 0.8
45 #RVFRAC = ####PLEASE SPECIFY####
46 ## (float), e.g. SLIP_COV = 0.85
47 #SLIP_COV = ####PLEASE SPECIFY####
48 # seed for stoch, e.g. SEED = 103245
49 SEED = 103245
50 # Mw Scaling Relation (string), one of:
51 # HanksBakun2002, BerrymanEtAl2002, VillamorEtAl2001
52 MWSR = ''####PLEASE SPECIFY####
```

5. Create the Model using make_src.sh

```

$ make_src.sh

Ececuting createsRF.py
Executing /nesi/projects/nesi00213/tools/genslip-v3.3read_erf=0write_srf=1read_gsf=1write_gsf=0infile=Srf
/source.gsfmag=5.500000nx=58ny=58ns=1nh=1seed=103245velfile=/home/jonney/code/SrfGen//lp_generic1d-
gp01_v1.vmodshypo=0.000000dhypo=2.877200dt=0.025000plane_header=1srf_version=2.0rvfrac=Noneshal_vrup=0.
6deep_vrup=0.6fdrup_time=1alpha_rough=Noneslip_sigma=None
seed=103245
mag= 5.50 median mag= 5.52 nslip= 1 nhypo= 1 random_seed =103245
nx= 58 ny= 58 dx= 0.0992 dy= 0.0992
0: 172.30055 -43.59977 58 58 5.7543 5.7543 150.0 54.0 0.0000
**** 16.5000 16.5000
ratio (negative slip)/(positive slip)= 0.002216
mom= 1.99526e+24 avgslip= 48 maxslip= 98
orig_sigma= 0.403256 ... new_sigma= 0.396138
rt_scalefac= 7.388430
ravg= 1.00000e+00 rmed= 9.86539e-01 rmin= 3.09826e-01 rmax= 1.93412e+00
seg= 0
nstk= 58 nx= 3 nxdiv= 3 nxsum= 58
ndip= 58 ny= 3 nydiv= 3 nysum= 58
Plotting SRF as square plot...
...
/home/jonney/20100904_Darfield_m7p1_201705221509/gmsim.cfg
making a symbolic link from source_map.png to /home/jonney/20100904_Darfield_m7p1_201705221509/Src
/Figures/source_map.png
making a symbolic link from source_square.png to /home/jonney/20100904_Darfield_m7p1_201705221509/Src
/Figures/source_square.png
attempt_upload.sh /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1
/t2_103245 /nesi/projects/nesi00213/RupModel/20100904_Darfield_m7p1 baes seb56
!!!! Ask Admin to upload: Give him the path: /home/jonney/20100904_Darfield_m7p1_201705221509/Src !!!!!

```

- Under the working directory Src, a subdirectory is created

```

$ ls /home/jonney/20100904_Darfield_m7p1_201705221509/Src/Model/20100904_Darfield_m7p1/t2_103245
cnrs.txt Info params_plot.py params_plot.pyc setSrfParams.py setSrfParams.pyc Srf Stoch

```

- Give the admin (Sung) the path to the Src working directory and request to upload the model. The admin will need to execute sendme.sh in the Src directory.

4. How to create observation files

note: you can skip this part if you are running for a future event (not yet happened)

- Go to the Obs directory that instruction has provided

```

cd /home/jonney/20100904_Darfield_m7p1_201705221509/GM/Obs

```

- Create the config file that is needed
- ```

$ config_obs.py geoNet_ftp_url

```

```

$ config_obs.py
Usage: /home/jonney/code/wrapper/config_obs.py URL
eg. URL: ftp://ftp.geonet.org.nz/strong/processed/Proc/2011/02_Feb/2011-02-22_012009/Vol11/data

```

```

$ config_obs.py ftp://ftp.geonet.org.nz/strong/processed/Proc/2010/09_Sep/2010-09-04_045556/Vol11/data
Done!

```

- Run make\_obs.sh to generate all the files

```

$ make_obs.sh
Reading input from /home/jonney/20100904_Darfield_m7p1_201705221509/GM/Obs/event_info.txt
/home/jonney/code/Vs30-mapping
Downloading data ...
Finished downloading data in 0.3 secs
Creating stations list ...
Done in 0.0 secs
Creating Vs30 files ...
Done Vs30 calcs in 21.0 secs
Processing .V1A files ...
Done processing in 21.2 secs
Creating acc and vel plots for all Observed SMSs ...
Done plotting acc, vel in 47.2 secs.
Creating pSA plots for all Observed SMSs ...
Done pSA plots in 55.8 secs.
Writting IMs for GMT plotting ...
Done in 5.1 secs.
Relocate plots to Figures directory
Attempting to upload station info to Fitzroy
/home/jonney/20100904_Darfield_m7p1_201705221509/gmsim.cfg
!!!! Ask Admin to upload: Give him the path: /home/jonney/20100904_Darfield_m7p1_201705221509/GM/Obs
!!!!

```

4. The Vs30 and station files will be under working directory Stat/event\_name

```

$ ls /home/jonney/20100904_Darfield_m7p1_201705221509/Stat/20100904_Darfield_m7p1
20100904_Darfield_m7p1.kml 20100904_Darfield_m7p1.vs30 Info Vs30_stderr.txt
20100904_Darfield_m7p1.ll 20100904_Darfield_m7p1.vs30ref Vs30.out Vs30_stdout.txt

```

5. Give the admin (Sung) the path to the Obs working directory and request to upload the model. The admin will need to execute `sendme.sh` in the Obs directory.

## 5. How to setup the simulation

1. After admin tells you that all files are uploaded to Fitzroy, Run `setup_remote.sh`  
`$setup_remote.sh username`

```

$ setup_remote.sh ykh22
/home/jonney/20100904_Darfield_m7p1_201705181350/gmsim.cfg
vel_mod_dir: /nesi/projects/nesi00213/VelocityModels/NZ/20100904_Darfield_m7p1/v1.65_400m
srf_path: /nesi/projects/nesi00213/RupModel/20100904_Darfield_m7p1/t2_103245/Srf/source.srf
stat_path: /nesi/projects/nesi00213/StationInfo/20100904_Darfield_m7p1/20100904_Darfield_m7p1.ll
remote_user: ykh22
remote cfg: /home/ykh22/gmsim.cfg
scp /home/jonney/20100904_Darfield_m7p1_201705181350/gmsim.cfg ykh22@fitzroy.nesi.org.nz:/home/ykh22
/gmsim.cfg
gmsim.cfg 100% 459 23.5KB/s 0.5KB/s 00:
00
Generation of model params has been skipped.
Re-directing related params to files under /nesi/projects/nesi00213/VelocityModels/NZ
/20100904_Darfield_m7p1/v1.65_400m
/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350
Permission /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350 : 750

Producing statcords and FD_STATLIST. It may take a minute or two
/nesi/projects/nesi00213/StationInfo/20100904_Darfield_m7p1/20100904_Darfield_m7p1.ll
From: /nesi/projects/nesi00213/StationInfo/20100904_Darfield_m7p1/20100904_Darfield_m7p1.ll
To:
 /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/fd_nz01-h0.400.statcords
 /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/fd_nz01-h0.400.ll
Done
Installation completed
=====
Instructions
=====
For Simulation (Fitzroy)
1. cd /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350
2. Edit params.py and run_emod3d.ll.template
3. ./submit_emod3d.sh
4. ./submit_post_emod3d.sh or ./submit_post_emod3d_mpi.sh (parallel)
5. ./install_bb.sh
6. ./submit_hf.sh and ./submit_bb.sh
For Plotting (hypocentre)
1. Plotting station based data (IMs, Vs30, Obs PGA, pSA): plot_stations.py {datafile}.ll
2. Plotting timeslice-based data (PGV,MMI,animation): plot_transfer.py auto /nesi/projects
/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350
3. PGV,MMI: plot_ts_sum.py Timeslice sequence: plot_ts.py

```

- The location on Fitzroy will be under /nesi/projects/nesi00213/RunFolder/username/event

```
$ cd /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350
```

## 6. Run the simulation on Low Frequency (LF)

- Go to the Simulation Folder, located at /nesi/projects/nesi00213/RunFolder/user/run\_name

```
$ cd /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350
```

- Run submit\_emod3d.sh

It will ask you to enter a wall\_clock\_limit and if it should auto submit the job.

```

$./submit_emod3d.h
devel
=====
Fetching WallClock time estimation from DB
=====
[3.4182194616977223e-07, 1.0417627567533496e-07, 6.560775746124221e-11]
nx=350 ny=300 nz=115 sim_duration=100 num_procs=512
Maximum: 0:06:52.750000
Average: 0:02:05.792853
Minimum: 0:00:00.079221
=====
Enter the WallClock time limit you will like to use: 5:30:00
=====
Also submit the job for you?
 1. Yes
 2. No
Enter the number you wish to select (1-2):1
Loadleveler script run_emod3d_source.ll written
Submitting run_emod3d_source.ll

```

**note: if you prefer to change some detail configurations, press 2(no) for auto submit.\***

```

$./submit_emod3d.sh
devel
=====
Fetching WallClock time estimation from DB
=====
[3.4182194616977223e-07, 1.0417627567533496e-07, 6.560775746124221e-11]
nx=350 ny=300 nz=115 sim_duration=100 num_procs=512
Maximum: 0:06:52.750000
Average: 0:02:05.792853
Minimum: 0:00:00.079221
=====
Enter the WallClock time limit you will like to use: 5:30:00
=====
Also submit the job for you?
 1. Yes
 2. No
Enter the number you wish to select (1-2):2
Loadleveler script run_emod3d_source.ll written
User chose to submit the job manually

```

use llsubmit to submit your job if you selected to not to auto submit.

```

$ llsubmit run_emod3d_source.ll
llsubmit: Processed command file through Submit Filter: "/gpfs_external/admin/LL_Oper_job_filter.py".
llsubmit: The job "f2n7.1440438" has been submitted.

```

3. Use llq to check if your job has finished. (job status: R= running, C= Complete, I = idle)  
\$ llq -u user

```

$ llq -u ykh22

```

| Id             | Owner | Submitted  | ST | PRI | Class   | Running On |
|----------------|-------|------------|----|-----|---------|------------|
| f2n7.1440438.0 | ykh22 | 5/25 04:10 | I  | 50  | General |            |

4. After Emod3d finished, run submit\_post\_emod3d.sh  
**note: if you prefer to change some detail configurations, press 2(no) for auto submit.\***  
\$ ./submit\_post\_emod3d.sh

```
./submit_post_emod3d.sh
devel
Also submit the job for you?
1. Yes
2. No
Enter the number you wish to select (1-2):2
Loadleveler script post_emod3d_source.ll written
User chose to submit the job manually
```

5. submit the job after you manually edited the post\_emod3d\_source.ll

```
$ llsubmit post_emod3d_source.ll
llsubmit: Processed command file through Submit Filter: "/gpfs_external/admin/LL_Oper_job_filter.py".
llsubmit: The job "f2n7.1440439" with 3 job steps has been submitted.
```

6. Use llq to check if your job has finished. (job status: R= running, C= Complete, I = idle)

```
$ llq -u ykh22
```

| Id             | Owner | Submitted  | ST | PRI | Class   | Running On |
|----------------|-------|------------|----|-----|---------|------------|
| f2n7.1440439.0 | ykh22 | 5/25 04:14 | R  | 50  | General |            |
| f2n7.1440439.2 | ykh22 | 5/25 04:14 | C  | 50  | General |            |
| f2n7.1440439.1 | ykh22 | 5/25 04:14 | C  | 50  | General |            |

## 7. Run the simulation on High Frequency (HF)

note: this part can run before LF is finished

1. Run install\_bb.sh, to setup the parameters  
Choose from the options according to simulation requirement

```

$./install_bb.sh
devel
Info: Old version of params.py supporting singular kappa and sdrop

EMOD3D HF/BB Preparationi Ver.devel

=====
Select one of 1D Velocity models (from /nesi/projects/nesi00213/VelocityModel/Mod-1D)
=====
1. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v1-midQ.1d
2. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v1.1d
3. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v2-midQ.1d
4. /nesi/projects/nesi00213/VelocityModel/Mod-1D/banks.1d
5. /nesi/projects/nesi00213/VelocityModel/Mod-1D/foothills.1d
6. /nesi/projects/nesi00213/VelocityModel/Mod-1D/foothills_v2.1d
7. /nesi/projects/nesi00213/VelocityModel/Mod-1D/plains.1d
Enter the number you wish to select (1-7):3
/nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v2-midQ.1d
=====
- Vel. Model 1D: Cant1D_v2-midQ
- hf_sim_bin: hb_high_v5.4.5_np2mm+
- hf_rvfac: 0.8
- hf_sdrop: 50
- hf_kappa: 0.045
- srf file: /nesi/projects/nesi00213/RupModel/20100904_Darfield_m7p1/t2_103245/Srf/source.srf
/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/LF/source/params_uncertain.
py
/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/HF/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045/source/params_bb_uncertain.py
[Errno 17] File exists
Permission /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/HF/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045 : 750
Permission /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/BB/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045 : 750

```

2. Run submit\_hf.sh

**note: if you prefer to change some detail configurations, press 2(no) for auto submit.\***

```

./install_bb.sh
devel
Info: Old version of params.py supporting singular kappa and sdrop

EMOD3D HF/BB Preparationi Ver.devel

=====
Select one of 1D Velocity models (from /nesi/projects/nesi00213/VelocityModel/Mod-1D)
=====
1. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v1-midQ.1d
2. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v1.1d
3. /nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v2-midQ.1d
4. /nesi/projects/nesi00213/VelocityModel/Mod-1D/banks.1d
5. /nesi/projects/nesi00213/VelocityModel/Mod-1D/foothills.1d
6. /nesi/projects/nesi00213/VelocityModel/Mod-1D/foothills_v2.1d
7. /nesi/projects/nesi00213/VelocityModel/Mod-1D/plains.1d
Enter the number you wish to select (1-7):3
/nesi/projects/nesi00213/VelocityModel/Mod-1D/Cant1D_v2-midQ.1d
=====
- Vel. Model 1D: Cant1D_v2-midQ
- hf_sim_bin: hb_high_v5.4.5_np2mm+
- hf_rvfac: 0.8
- hf_sdrop: 50
- hf_kappa: 0.045
- srf file: /nesi/projects/nesi00213/RupModel/20100904_Darfield_m7p1/t2_103245/Srf/source.srf
/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/LF/source/params_uncertain.
py
/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/HF/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045/source/params_bb_uncertain.py
[Errno 17] File exists
Permission /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/HF/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045 : 750
Permission /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/BB/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045 : 750
ykh22@nesi1 /nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350 :./submit_hf.sh
devel
SERIAL
['/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/HF/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045/source']
Also submit the job for you?
1. Yes
2. No
Enter the number you wish to select (1-2):1
Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source
Loadleveler script run_hf_Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source.ll written
Submitting run_hf_Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source.ll

```

3. use llsubmit to submit your job if you selected not to auto submit.

```

$ llsubmit run_hf_Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source.ll
llsubmit: Processed command file through Submit Filter: "/gpfs_external/admin/LL_Oper_job_filter.py".
llsubmit: The job "f4n7.1495670" has been submitted.

```

4. Use llq to check if your job has finished. (job status: R= running, C= Complete, I = idle)

| llq -u ykh22Id | Owner | Submitted  | ST | PRI | Class   | Running On |
|----------------|-------|------------|----|-----|---------|------------|
| f4n7.1495670.0 | ykh22 | 5/25 03:04 | R  | 50  | General | f7n13      |

## 8. Run the Simulation on Broadband (BB)

**Note: This part MUST wait untill both LF and HF are finished**

1. Run submit\_bb.sh  
\$ ./submit\_bb.sh

```

$./submit_bb.sh
devel
['/nesi/projects/nesi00213/RunFolder/ykh22/20100904_Darfield_m7p1_201705181350/BB/Cant1D_v2-
midQ_hfnp2mm+_rvf0p8_sd50_k0p045/source']
Also submit the job for you?
 1. Yes
 2. No
Enter the number you wish to select (1-2):1
Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source
Loadleveler script run_bb_Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source.ll written
Submitting run_bb_Cant1D_v2-midQ_hfnp2mm+_rvf0p8_sd50_k0p045__source.ll

```

2. Use llq to check if your job has finished. (job status: R= running, C= Complete, I = idle)

| llq -u ykh22Id | Owner | Submitted  | ST | PRI | Class   | Running On |
|----------------|-------|------------|----|-----|---------|------------|
| f2n7.1440499.0 | ykh22 | 5/25 03:04 | R  | 50  | General | f7n13      |



## Related articles

- [Ground Motion IM Procedure](#)
- [Automated Earthquake Location Procedure](#)
- [Writing an automated test with Selenium](#)
- [Real-time Ground Motion Simulation Setup](#)
- [QuakeCoRE SW Team Code Review](#)