B. Earth model

Contents

1 Elastic half space

See Okada (1992) for details on dislocation in elastic half space.

2. Multi-layered elastic half space

See Wang et al. (2003) for details on Green function in layered elastic half space.

3. Multi-layered viscoelastic half space

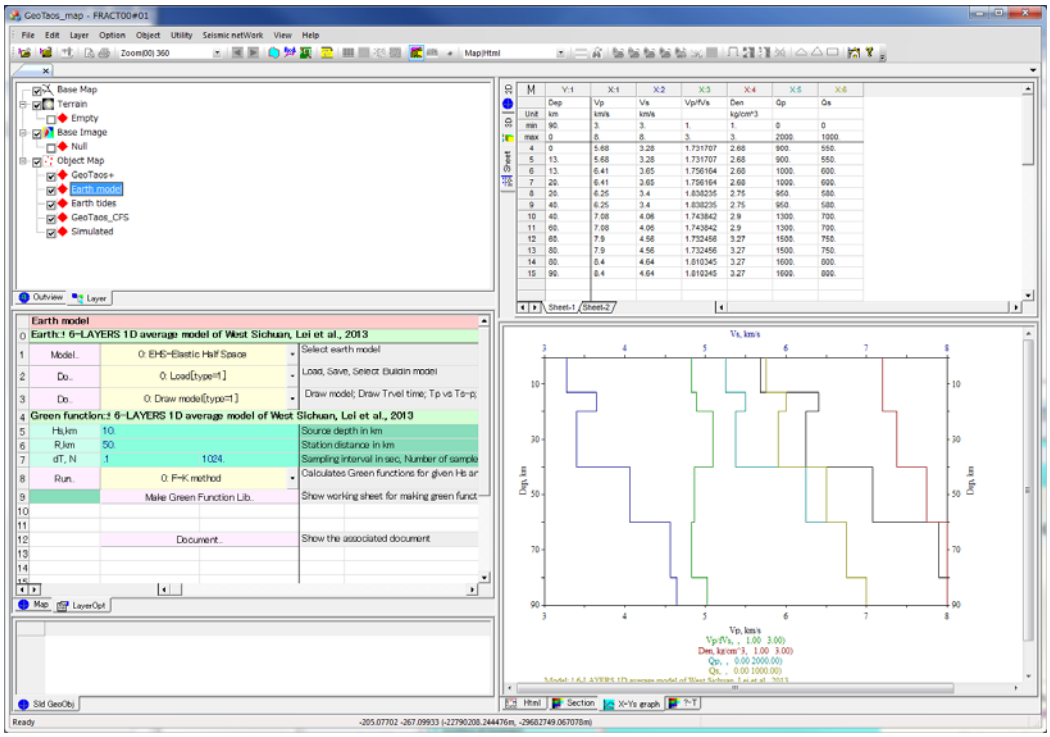
See Wang et al. (2006) for details on Green function in layered viscoelastic half space.

A. A guide to GeoTaos_map::Earth model

GeoTaos_map::Earth model is a built-in layer of GeoTaos_map providing utilities associated with the crust model which are used for calculation of green function and used by other layer such as [SeismicEvt] for hypocenter relocation. One can select a model from the built-in models, load from pre-pared text files, change model parameters, and save the edited model data to a text file.

The major utility of "GeoTaos_map::Earth model" is the calculation using edgrn (Wang et al., 2003) and psgrn (Wang et al., 2006). For the purpose of creating an integrated data file of all green functions in a single

file in binary formatted, which is ready for GeoTaos::CFS for the calculation of CFS, the original edgrn and psgrn codes have been modified at a few points and recompiled as edgrn_lei and psgrn_lei.



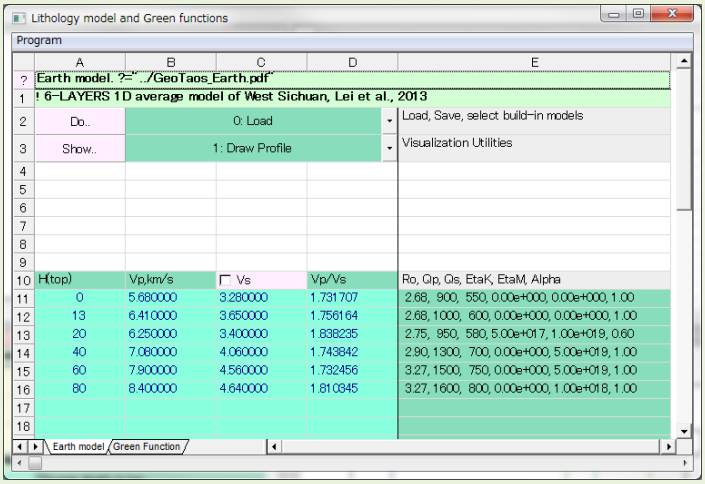
The following presents an example of model file, which is used by Lei et al. (2013) for the calculation of time-dependent deformation after the Mw7.9 Wenchuan earthquake. One can use this file as a template to make new model files.

GeoTas/Data_Crust_Models/Vel_West_Sichuan_6layer_SL_middle_crust.txt

```
! 6-LAYERS 1D average model of West Sichuan, Lei et al., 2013
layers=6 format=1 (given top depth of each layer)
! Htop   Vp[km/s] Vs[km/s] Ro[g/cm^3]   Qp    Qs     Eta_k      Eta_m     Alfa
  0.0      5.68     3.28       2.68      900   550    0.0E+00    0.0E+00    1.000
 13.0      6.41     3.65       2.68     1000   600    0.0E+00    0.0E+00    1.000
 20.0      6.25     3.40       2.75      950   580    5.0E+17    1.0E+19    0.600 //SL, middle crust
 40.0      7.08     4.06       2.90     1300   700    0.0E+00    5.0E+19    1.000 //ML,  lower crust
 60.0      7.90     4.56       3.27     1500   750    0.0E+00    5.0E+19    1.000 //ML, uppermost mantle
 80.0      8.40     4.64       3.27     1600   800    0.0E+00    1.0E+18    1.000 //ML, upper mantle
```

A.1 Create green functions of layered elastic/visco-elastic lithology model

1) Click GeoTaos_map::Earth model->[row9][Make Green function lib..] to show working sheet.



2) You can also load a different model by click [Do..] when [0: Load] is selected and check every parameters shown in lower part of the [Earth model] working sheet. Editing is reserved in the present version.

3) Click [Green Function] to swap to working sheet for making Green functions.

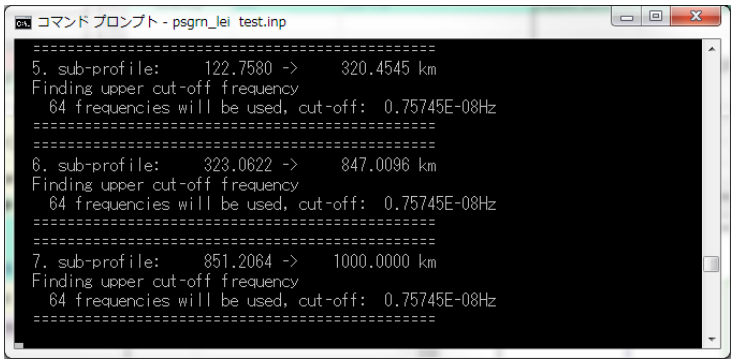
4) Select one of "0: Green function (elastic)" and "1: Green function (visco-elastic)" and modify parameters in rows from 5 to 11.

5) Click [Save..] to create a input file for edgrn_lei (elastic) or psgrn_lei (visco-elastic) program. The saved file will be open by notepad for your verification and further modification.

6) Click [Run edgrn_lei/psgrn_lei] in row-16, you will promoted to select an input file and specify the executable file edgrn_lei.exe/psgrn_lei.txt. You should select correct input file for correction executable file. The optional parameters for edgrn_lei.exe and psgrn_lei.exe differ from each other.

7) You will a command prompt window as the following one if the program has started normally; otherwise, some problem existed in the input file.

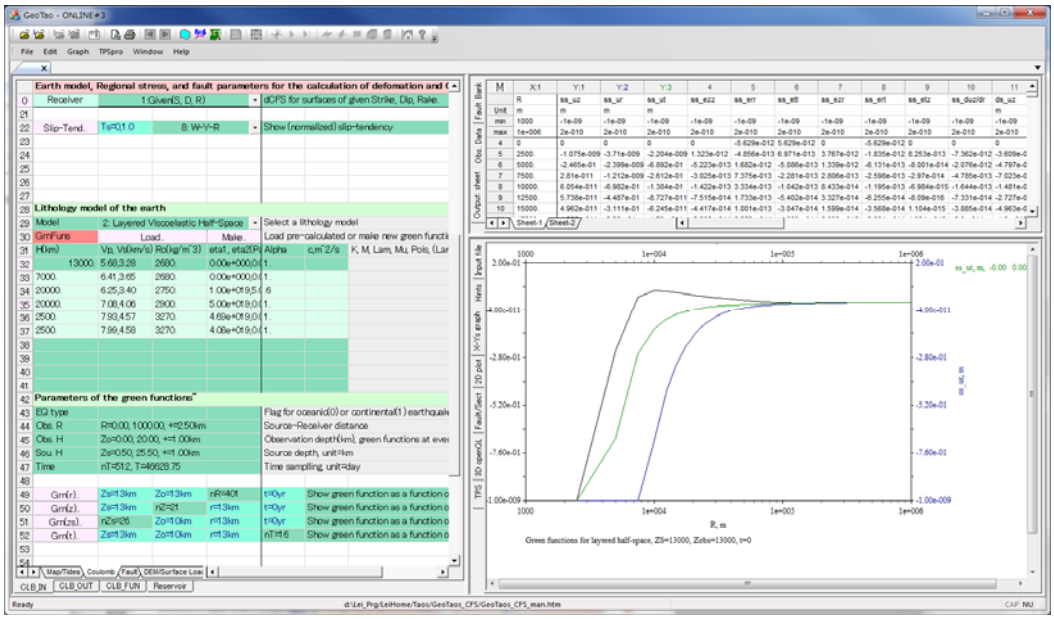
8) You can copy the executable file to the directory the input file is stored, open a command prompt window, CD (change directory) to the directory, and run the program by typing "psgrn_lei your.inp". Here, you should type correct file name instead of "your.inp". You will see some messages on abnormal termination. Both edgrn and psgrn have upper limitations on number of source depth, number of horizontal and depth points for which the Green functions are calculated.



B. A guide to GeoTaos::CFS::Earth model

One can also create Green functions from GeoTaos::CFS. Runt GeoTaos and open a CFS (XML) file or open a [new][Coloumb stress] document to start GeoTaos::CFS. Click [CLB_IN][Coulomb] to show [Coulomb] working sheet. Click [Row-30][Make] to show [Make Green function lib..], then follows guide introduced in A.1.

From [CLB_IN][Coulomb] you can load a pre-made file with integrated Green functions and show the functions against a number of variables such as Source-Observation distance for giving source depth and given observation depth. For time-dependent green functions, you can plot any function at specified observation distance and depth for a given source depth against time.



Refferences

雷兴林，马胜利，苏金蓉，王小龙，2013. 汶川地震后中下地壳及上地幔的粘弹性效应引起的应力变化与芦山地震的发生机制，地震地质, 35, 2, 411-422, doi:10.3969/j.issn.0253-4967.2013.02.01

(Lei Xinglin, Ma Shengli, Su Jinrong, Wang Xiaolong, 2013. Inelastic triggering of the 2013 Mw6.6 Lushan earthquake by the 2008 Mw 7.9 Wenchuan earthquake, Seismology and Geology, 35, 2, 411-422, doi:10.3969/j.issn.0253-4967.2013.02.01)

Okada Y. 1992. Internal deformation due to shear and tensile faults in a half-space. Bull. Seismol. Soc. Am. 82: 2, 1018-1040.

Wang R., F. Lorenzo-Martin, F. Roth (2006), PSGRN/PSCMP--a new code for calculating co- and post-seismic deformation, geoid and gravity changes based on the viscoelastic-gravitational dislocation theory, Computers & Geosciences, 32, 527-541.

Wang R., F. Lorenzo-Martin, F. Roth (2003), Computation of deformation induced by earthquakes in a multi-layered elastic crust--FORTRAN programs EDGRN/EDCMP, Computers & Geosciences, 29, 195-207.