Program: hazFXNGA7.f
Language: fortran95 (gfortran)
Purpose: Compute probabilistic seismic hazard at various sites from a set of known faults
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To run: hazFXNGA7.exe input.file > log.file
Sample Input File. Comments are given in blue. These blue comments are not read by the program. The data on the left side are what the program needs.
Here is an example input file:

```
0               !use grid-of-sites option (1 or more implies list of stations)
0 22. 0.1       !min lat, max lat, dlat.  Site grid in Thailand&Indonesia
94. 105. 0.1          !min long, max long, dlong (in degrees)
760. 1          !Vs in upper 30 m, 760 m/s here; depth to Vs2500 (km)
1. 200.         !deltaR (km) and Rmax (km). For this run Rmax is 200.
3               !number of spectral periods to consider.
0. 0 0          !0 indicates PGA, next line is output file name
thaipga.char.highQ
19              ! number of PGA samples. Next lines are sample values
.005 .007 .0098 .0137 .0192 .0269 .0376 .0527 .0738 .103 .145 .203
.284 .397 .556 .778 1.09 1.52 2.13
2               !number of attenuation models to use in analysis
2 0.5 1000. 1 0 !Toro model at NEHRP B/C boundary, half weight
7 0.5 1000. 1 0 !Somerville et al. for finite faults, half weight
0.2 0 0               !0.2-sec PSA (5 hz), next line is output file name
thai5hz.char.highQ
19
.005 .0075 .0113 .0169 .0253 .0380 .0570 .0854 .128 .192 .288 .432
.649 .973 1.46 2.19 3.28 4.92 7.38
2
2 0.5 1000. 1 0 !Toro NEHRP B/C atten
7 0.5 1000. 1 0 !Somerville finite faults
1.0 0 0 sec PSA  !1-s is 3rd spectral period. Next line, output file name
thai1hz.char.highQ
20                    !number of 1-s SA samples is 20. Here they are:
.0025 .00375 .00563 .00844 .0127 .0190 .0285 .0427 .0641 .0961
0.144 .216 .324 .487 .730 1.09 1.64 2.46 3.69 5.54
2                     !number of attenuation models for 1-s
2 0.5 1000. 1 0 !Toro NEHRP B/C site. Half weight to 1000 km.
7 0.5 1000. 1 0 !Somerville finite faults, half weight to 1000 km.
```

```
1. 1.                !distance sampling on fault (km) and dmove (km)
1                    !number of epistemic branches on magnitude, 1
0                    !dM for branches (0 here because only one)
1                    !weights for branches (full weight for only branch)
0 1                  !dM for aleatory branches (also 0 here). Mwid.
 1 3 1    ! Thoen fault , 1= characteristic, 3=normal slip 1= # of Mags
 7.43 2.450473E-4 1.0  !Char. mag, char rate, epistemic weight (1)
 60.0 17.320515 0.0E+0 106.646514      !dip(d), fault width, top(km)
 9                   !number of points on discretized fault
     18.26392      99.81272   !lat°, long° of 1st point of Thoen fault
     18.17707      99.74847   !lat, long of 2nd point
     18.10844      99.69968   !Other points follow
     18.04114      99.58109
     18.01505      99.57042
     17.93080      99.45937
     17.78529      99.35471
     17.66522      99.30668
     17.52629      99.20238
…                              !Continue listing fault descriptions here.
(The above fault was computed to be 106.64 km long.)
```

Notes: If you want to perform analysis for a list of sites instead of a grid of stations, the first line of file should begin with *n*, the number of stations (<30). Then list the station coordinates and their names. Example:

```
2
13.65 100.7 Bangkok1
13.75 100.6 Bangkok2
…
```

In this example, PSHA analysis will be done for two sites in and around Bangkok.

There are many options the code is able to work with. You can use up to seven attenuation models per spectral period. The index or code for each of these is contained in the comments early in the source code.

You can consider up to seven spectral periods per run. Different attenuation models work with different sets of periods. If you select

common periods, such as 0.2 and 1.0 s, all of the models will work. If you select uncommon periods, such as 5.0 seconds, many models won't work. Newer models, such as NGA (Next Generation of Attenuation Models) often have more periods to choose from.
Attenuation model Indexes are similar to those of hazgridXnga2 but they can be different.
Here is a current list of attenuation models available in hazFXnga7:

Some are for fixed site conditions and some for
Vs-30 dependent site conditions. CEUS fixed site is HR or FR; WUS FR or soil.

INDEX	**Whose Model?**
1	Spudich *et al.*, 2000. Model form is based on BJF93. Has BJF97 siteamp
2	Toro *et al.* (SRL, 1997) ceus BC rock (this is a high-Q model)
-2	Toro *et al.* ceus hard rock
3	Sadigh *et al.* (rock-site coeffs.& eqn) firm rock
4	AB06 BC Atkinson and B00re 2006
-4	AB06 hardrock. There is a siteamp that is added to hardrock median; however, it is 0 (in logspace) for vs30=760.
5	AB94 ceus for BC rock site condition
-5	AB94 HRceus
6	Frankel *et al.* BC rock, ceus
-6	Frankel *et al.* HardRock ceus
7	Somerville *et al.* ceus. BCrock. Use with faults in high-Q environment
-7	Somerville ceus. hardrock.
8	Abrahamson-Silva 1997. firm rock.
9	Campbell and Bozorgnia 2003. firm rock.
10	Campbell CEUS BC or firmrock 2003.
-10	Campbell CEUS NEHRP A or hardrock 2003.
11	BJF 1997. All Vs30 allowed, like NGA relations. Mech dependent
12	Motazetti and Atkinson, developed for Puerto Rico/VI. Limited period set.
13	boore-atkinson nga updated to the 10-27-2006 version
14	campbell-bozorgnia nga updated to the 11-2006 version the CB update includes peak displacement, a novelty. Sigma for random horizontal component is the default now.
15	chiou-youngs nga version 6-2006. Has 105 spectral periods, no PGV.
16	abrahamson-silva preliminary nga. Do not use. This will change.
17	Idriss NGA model. For pga only, oct 2005.