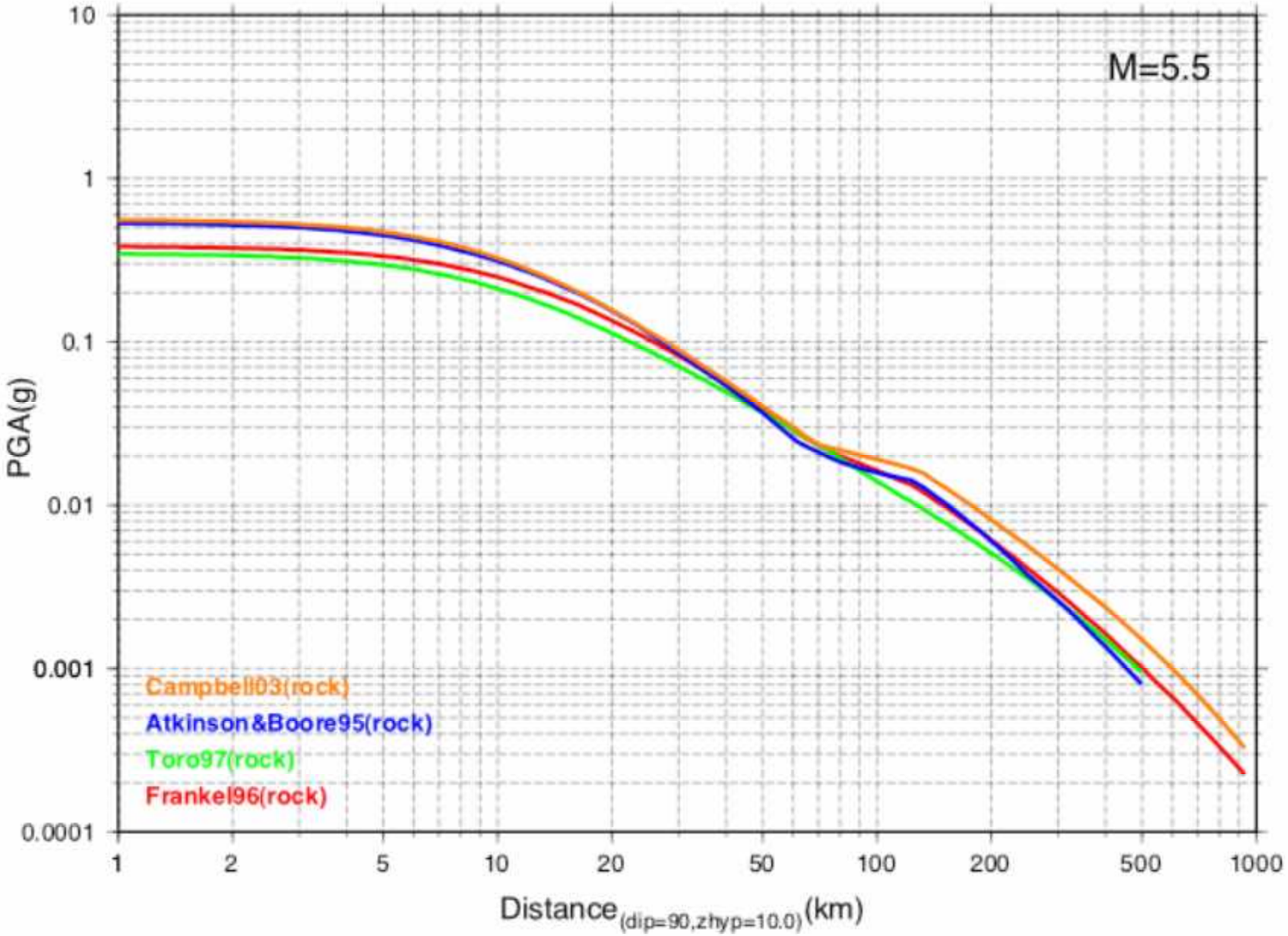
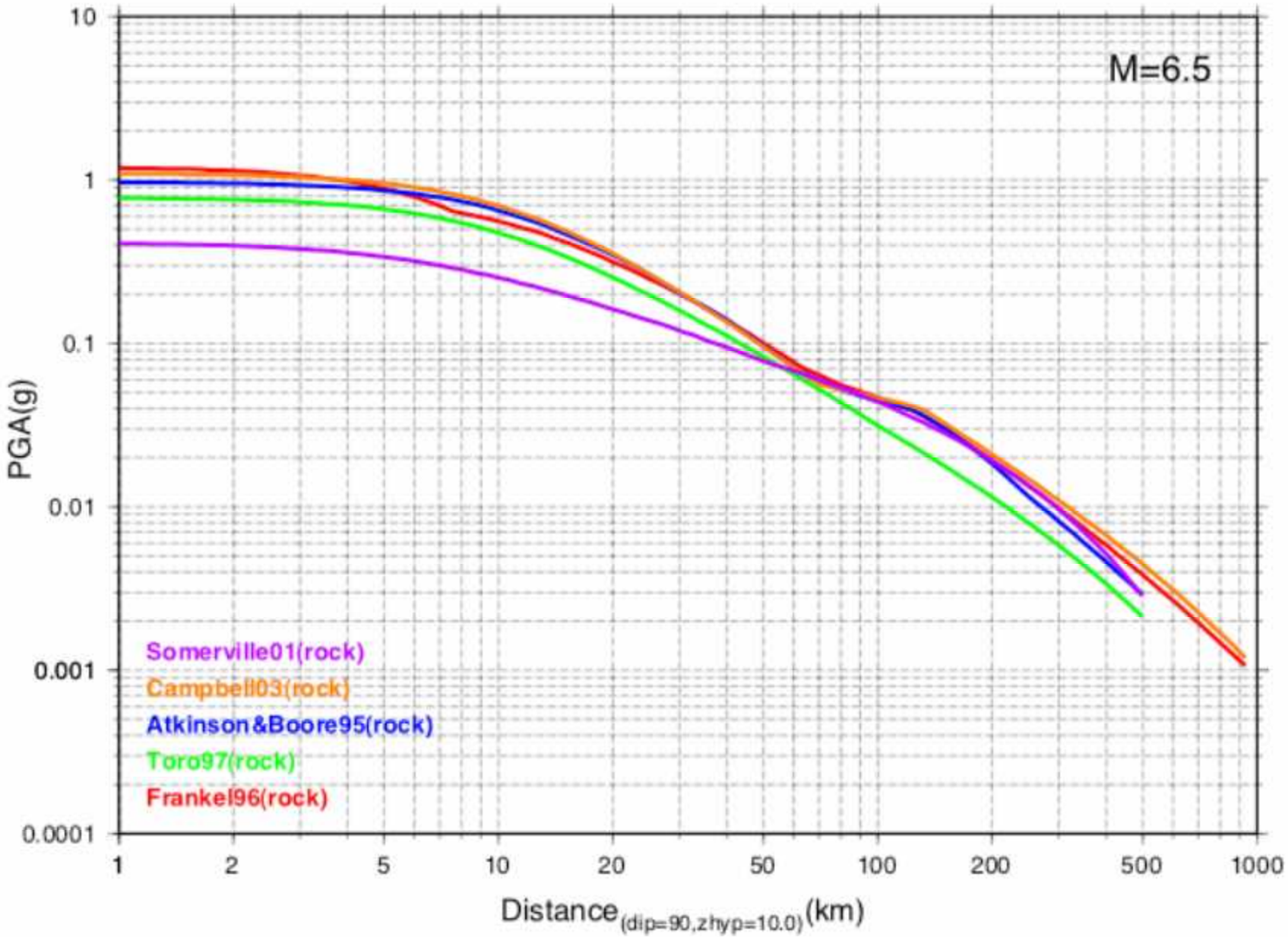
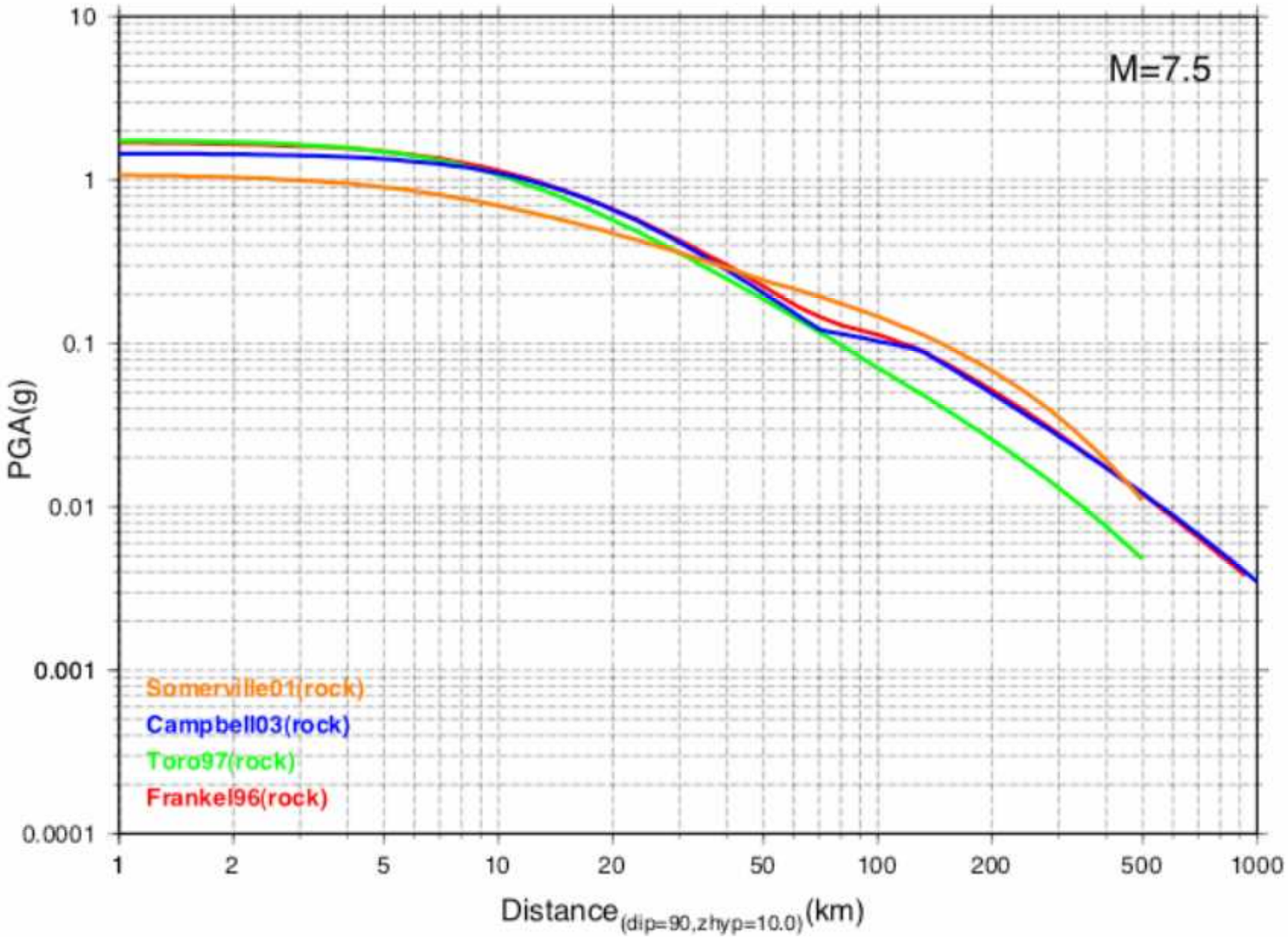
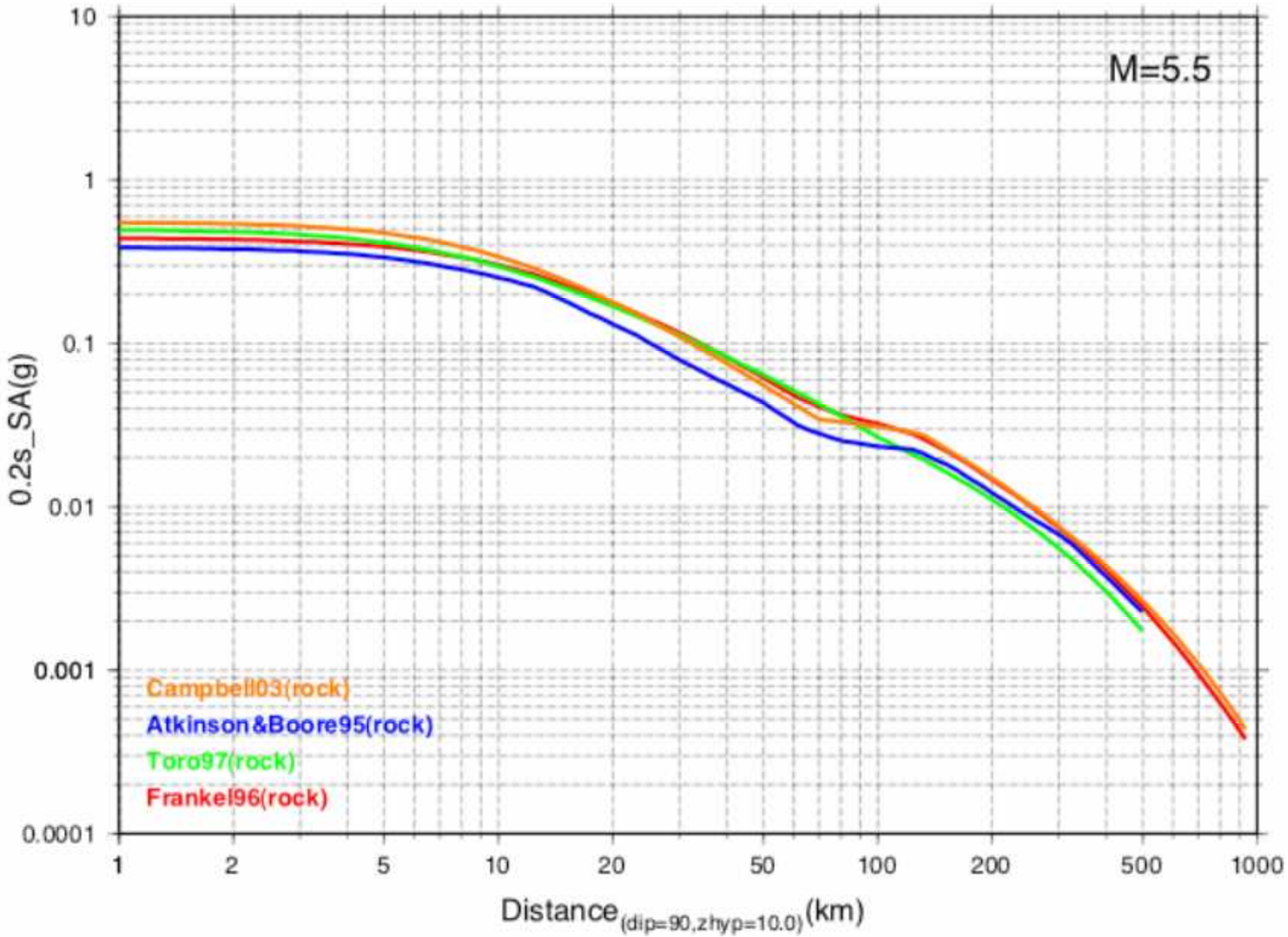
# 2002 CEUS Attenuation Relations

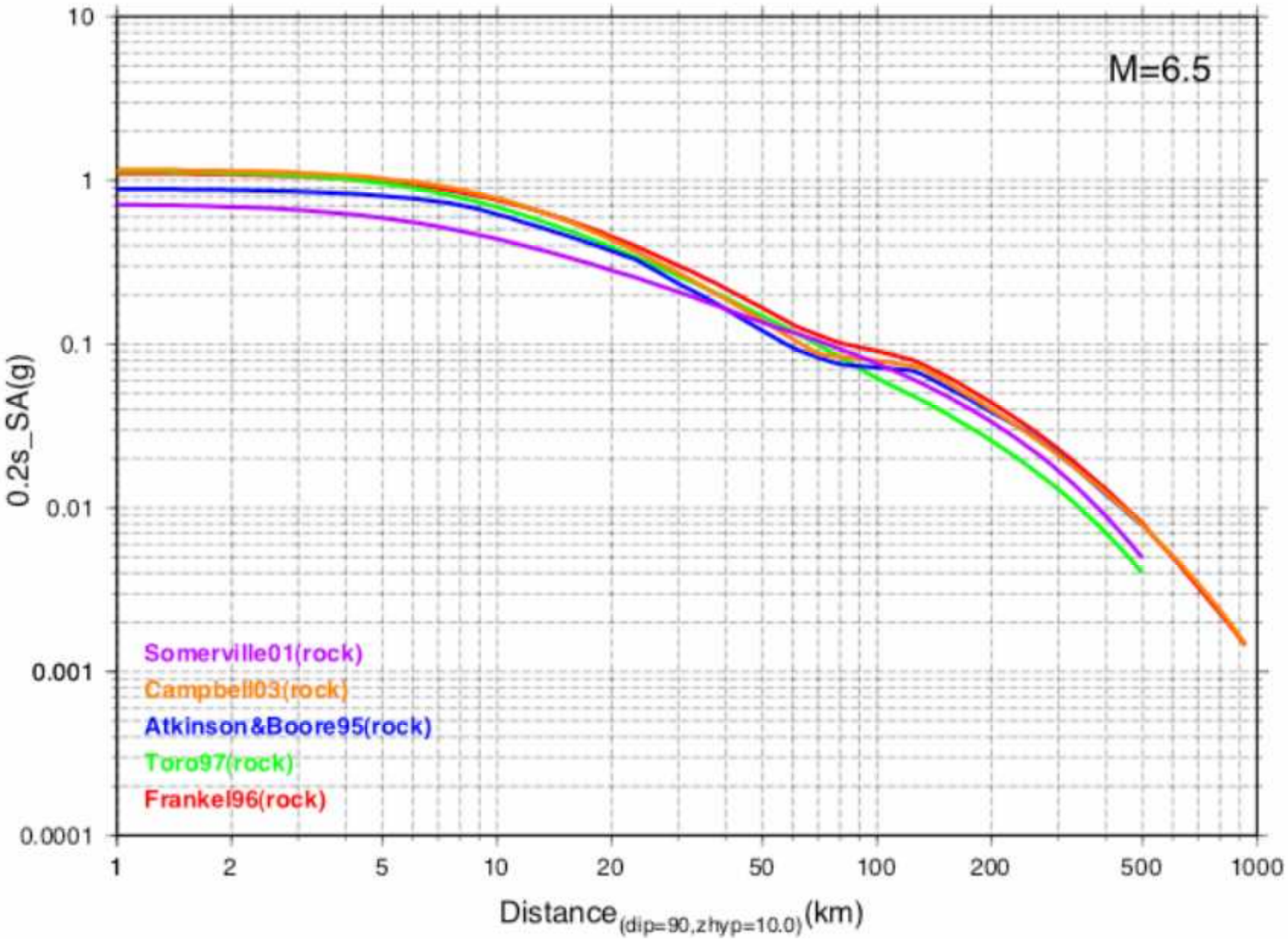
| | **Toro 1993,1997** | **Frankel 1996** | **Atkinson & Boore 1995,1997** | **Somerville 2001** | **Campbell 2003** |
|---|---|---|---|---|---|
| Method | stochastic, point source, omega$^2$ | stochastic, point source, omega$^2$ | stochastic, point source, double omega$^2$ | finite fault w/ green's functions | hybrid empirical w/ wna host & ena/wna adj |
| Range | 5.0 < m < 8.0 r < 500 km | 4.4 < m < 8.2 r < 1000 km | 4.0 < m < 7.25 r < 500 km | 6.0 < m < 7.5 r < 500 km | 5.0 < m < 8.2 r < 1000 km |
| Weight for Gridded Seismicity | 0.286 | 0.286 | 0.286 | not used | 0.143 |
| Weight for Charleston & New Madrid | 0.25 | 0.25 | 0.25 | 0.125 | 0.125 |

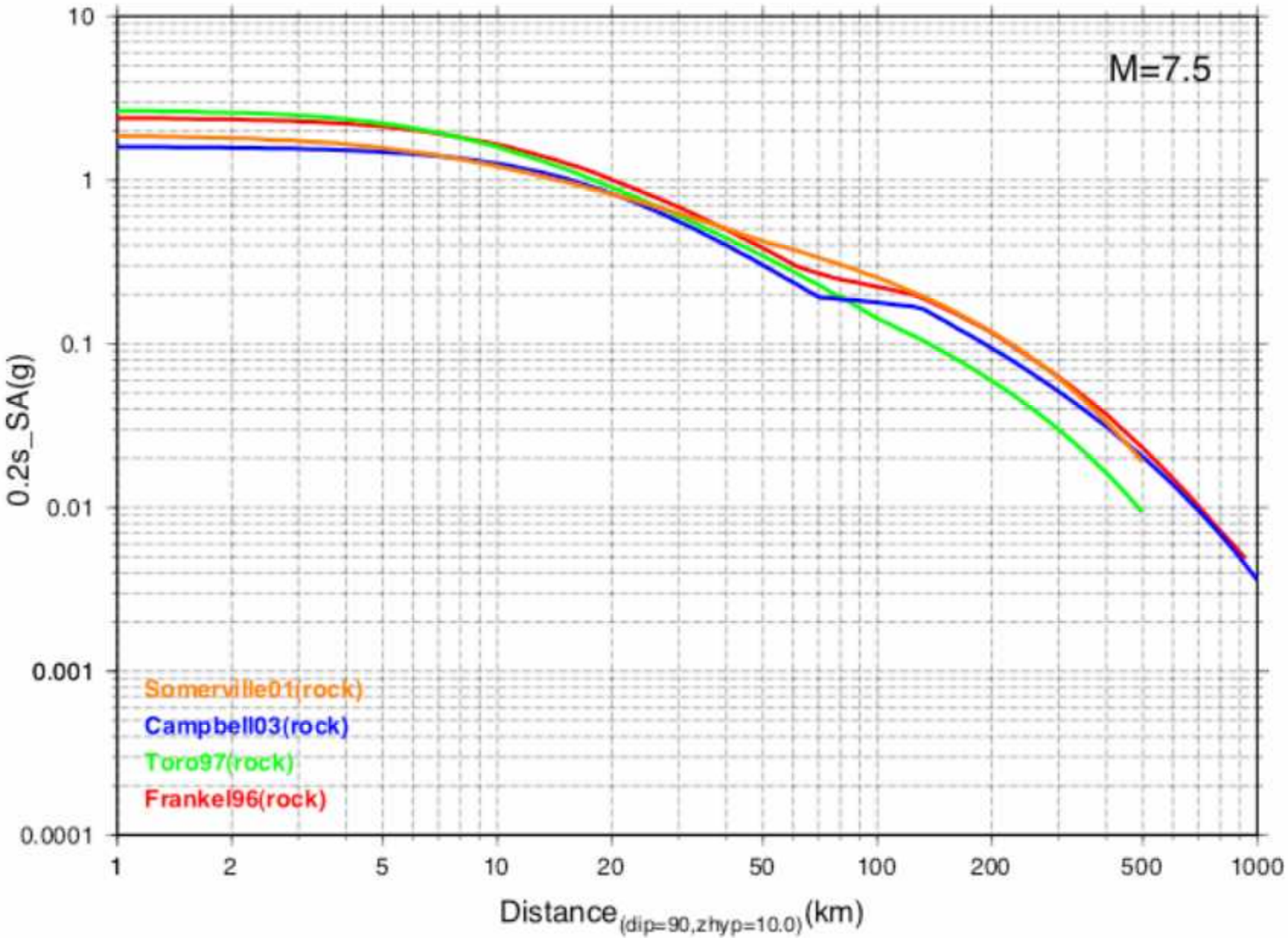

M=5.5
PGA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)

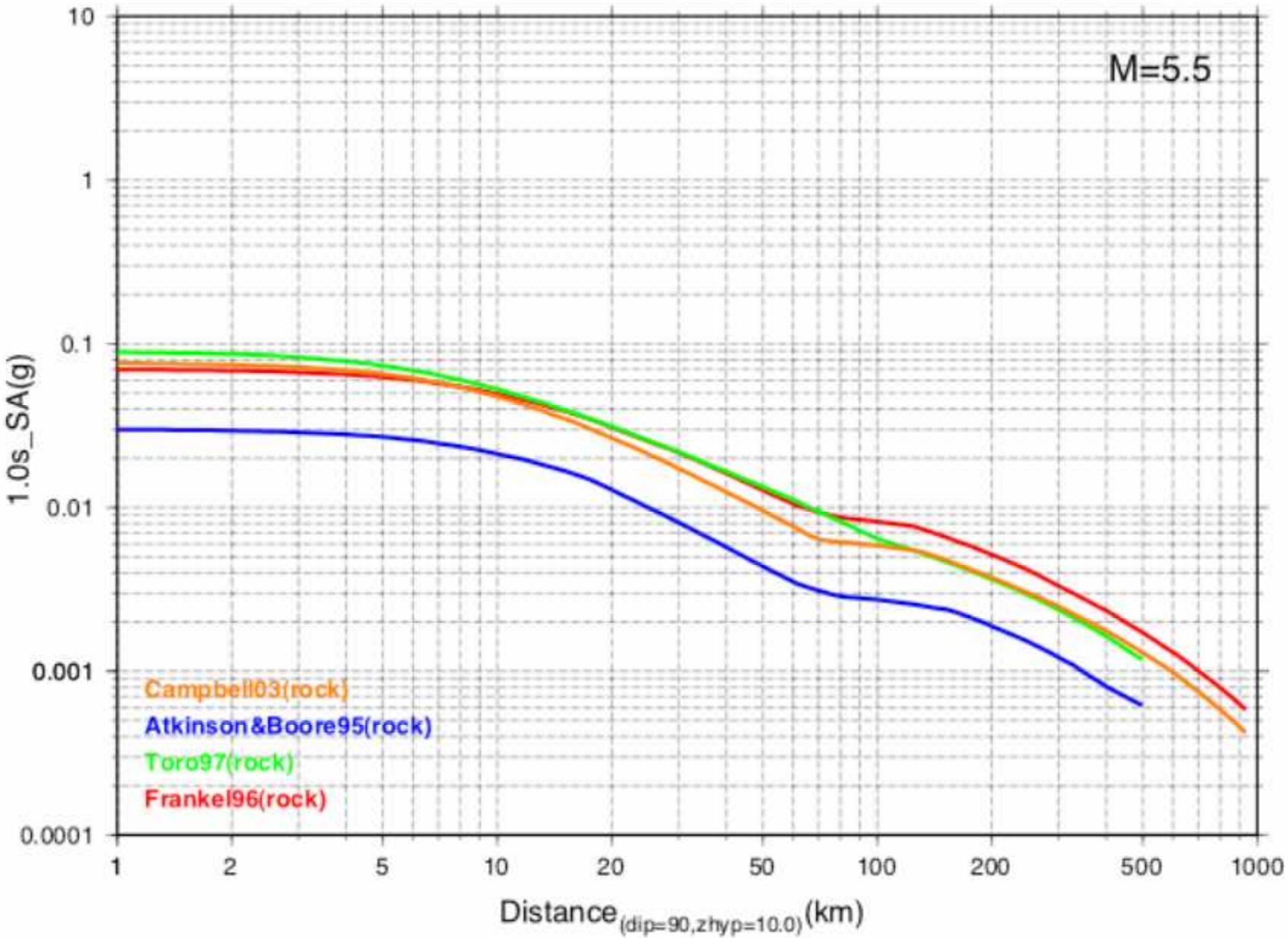

M=6.5
PGA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)

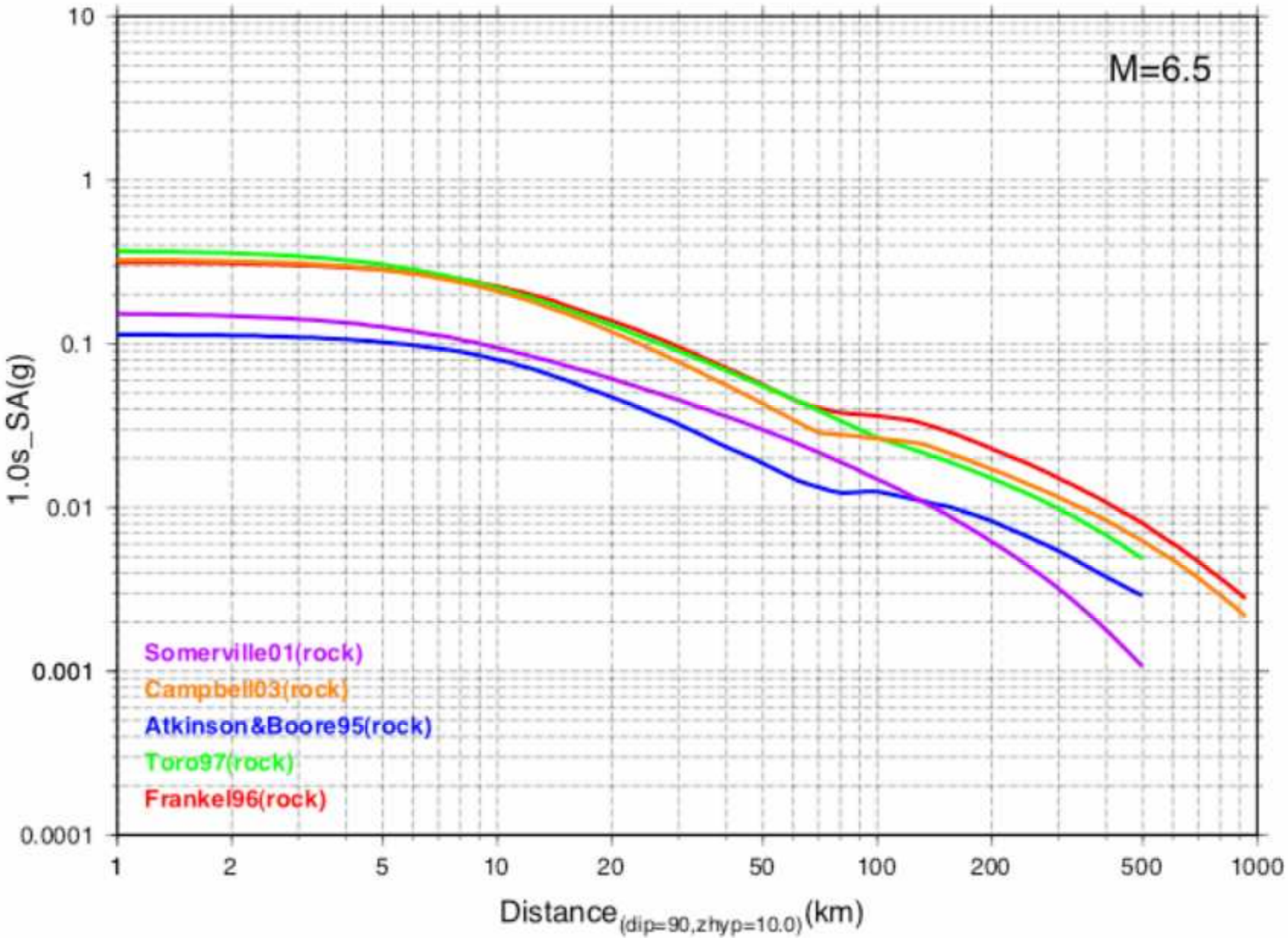

M=7.5
PGA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Toro97(rock)
Frankel96(rock)

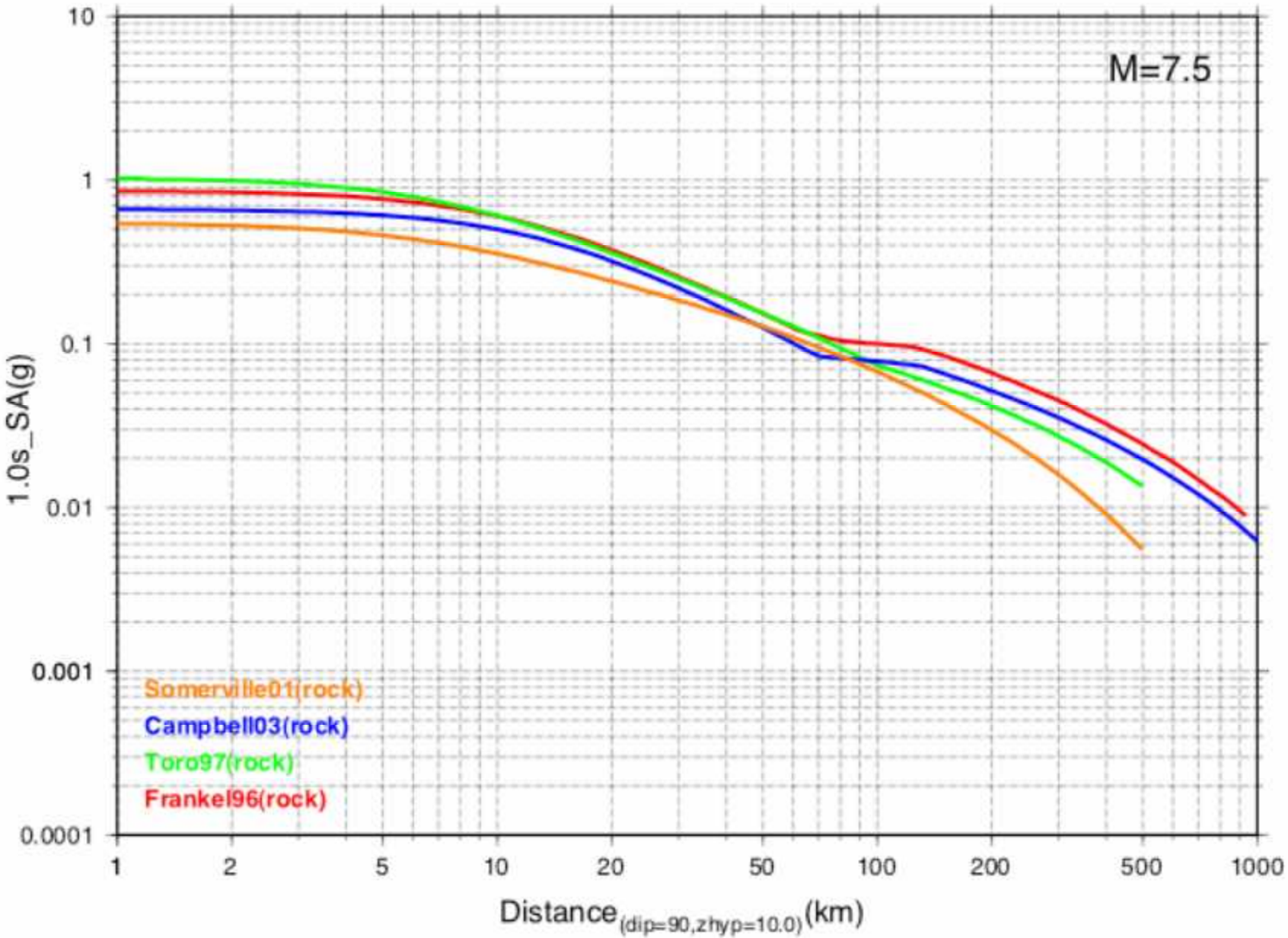

M=5.5
0.2s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)

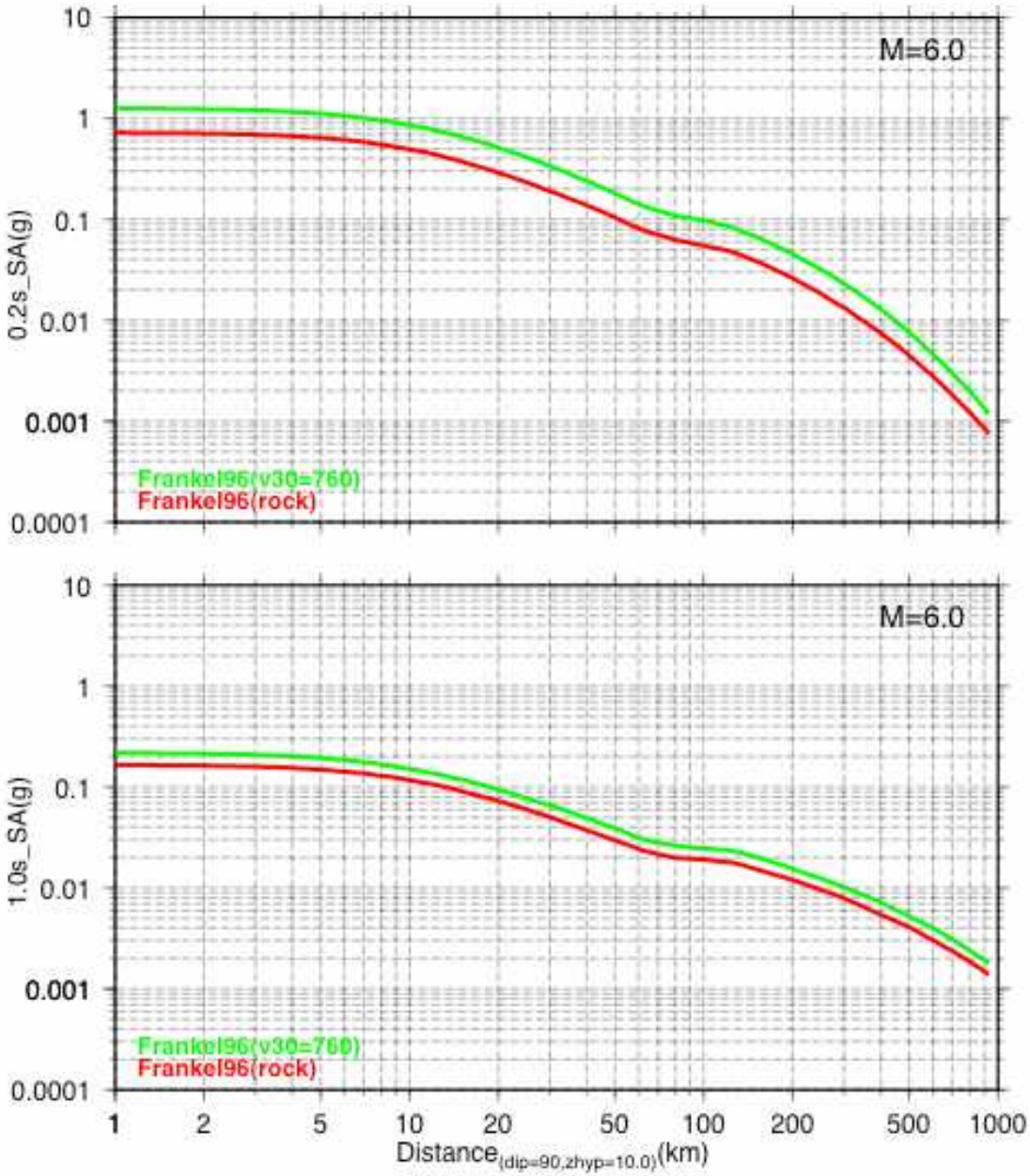

M=6.5
0.2s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)


M=7.5
0.2s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Toro97(rock)
Frankel96(rock)


M=5.5
1.0s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)


M=6.5
1.0s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Atkinson&Boore95(rock)
Toro97(rock)
Frankel96(rock)


M=7.5
1.0s_SA(g)
10
1
0.1
0.01
0.001
0.0001
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)
Somerville01(rock)
Campbell03(rock)
Toro97(rock)
Frankel96(rock)


M=6.0
0.2s_SA(g)
10
1
0.1
0.01
0.001
0.0001
Frankel96(v30=760)
Frankel96(rock)
M=6.0
1.0s_SA(g)
10
1
0.1
0.01
0.001
0.0001
Frankel96(v30=760)
Frankel96(rock)
1
2
5
10
20
50
100
200
500
1000
Distance(dip=90,zhyp=10.0)(km)

# Attenuation Issues

- Relations to Add / Delete
- Weights / Clustering by Relation Type

  (single-corner $\omega^2$, finite-fault, etc.)
- Ground Motion Saturation, Relation to WNA
- B/C-boundary Conversions

  (Vs and kappa assumptions)