SEISMOGRAPH

Verification Examples (C2)

PSHA Tool: Attenuation Models Examples

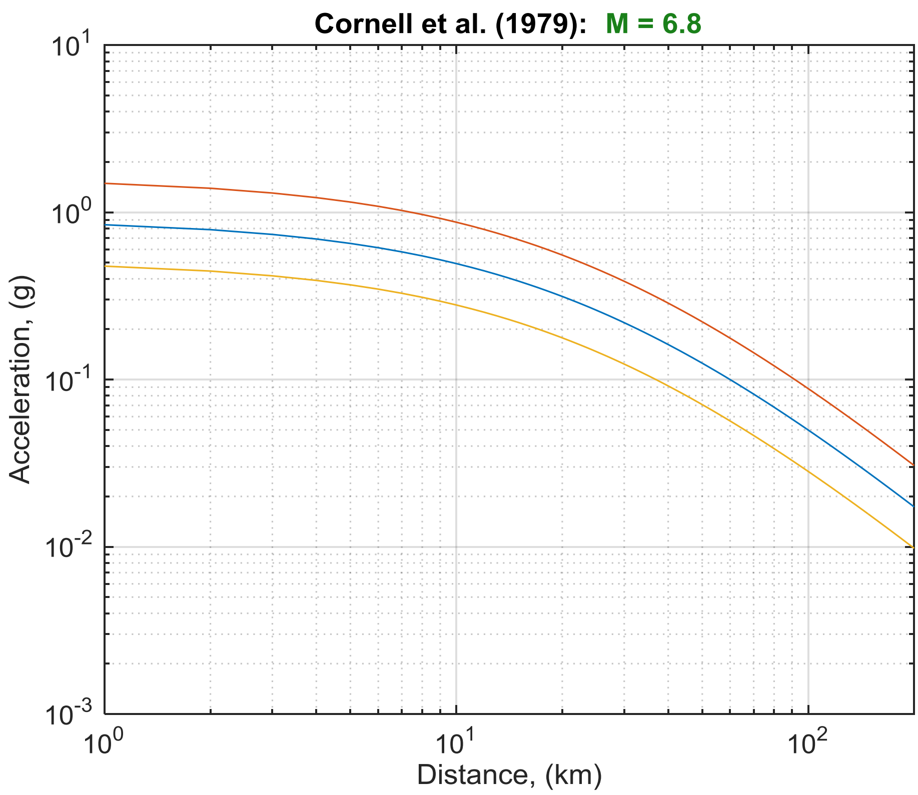
Attenuation Models Examples

Examples of Built-in Attenuation Models of the SEISMOGRAPH have been illustrated in the next pages, as outlined in the table below.

1	Cornell et al. (1979)
2	Amberseys (1975)
3	Amberseys (1990)
4	Campbell (1989)
5	Joyner & Boore (1981)
6	Joyner & Boore (1988)
7	Campbell (1997)
8	Campbell & Bozorgnia (2003)
9	Campbell & Bozorgnia (2008)
10	Abrahamson & Silva (1993)
11	Abrahamson & Silva (2008)
12	Sadigh et al. (1997)
13	Boore et al. (1997)
14	Boore & Atkinson (2008)
15	Zare et al. (1999)
16	Zare & Sabzali (2006)
17	Ghodrati Amiri et al. (2007)
18	Ghodrati Amiri et al. (2010)
19	Ghasemi et al. (2009)
20	Youngs et al. (1988)
21	Chiou & Youngs (2008)
22	Idriss (1993)

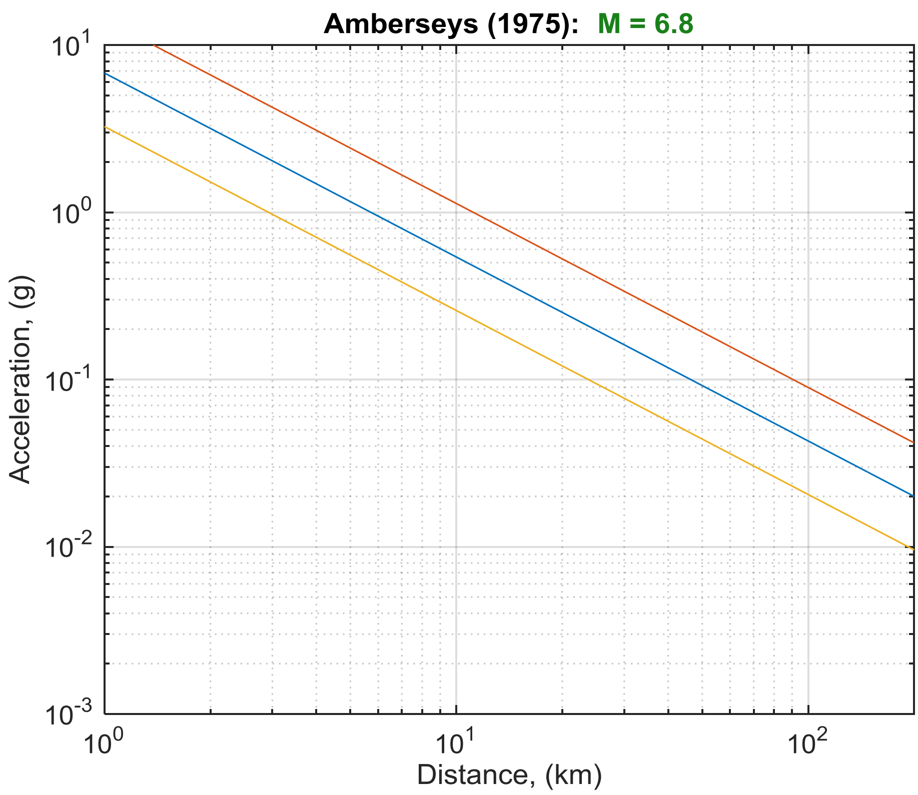
1. Cornell et al. (1979)

Cornell et al. (1979)	
ln(Ap) = 6.74 + 0.859M - 1.8ln(R+25)	
Unit:	(cm-s)



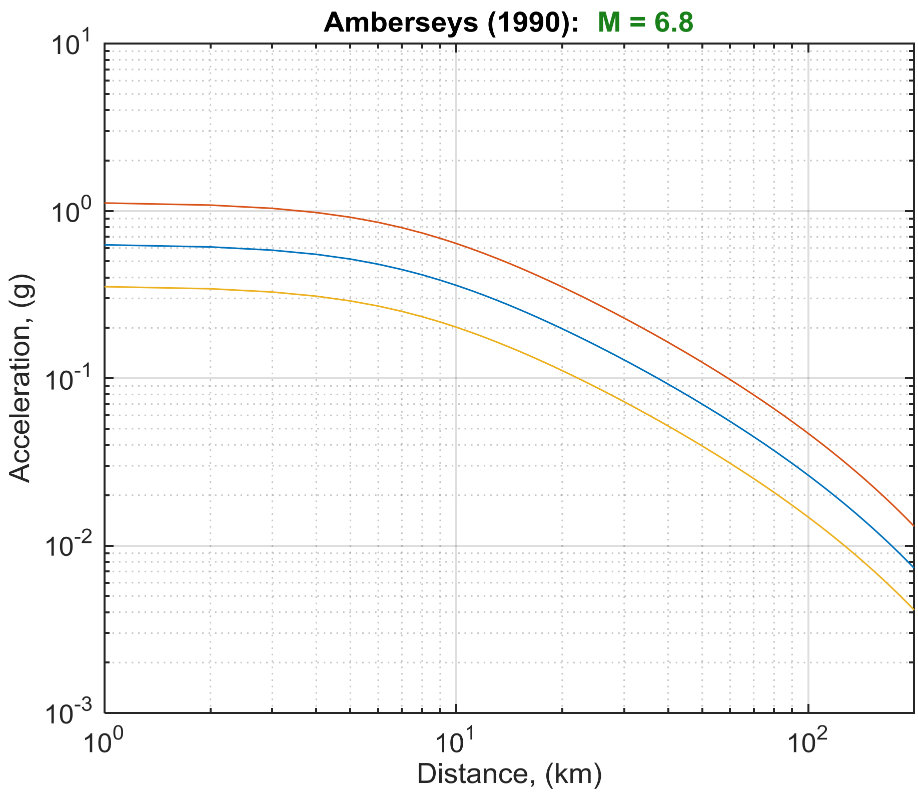
2. Amberseys (1975)

Amberseys (1975)	
log(Y) = -0.46 + 0.63ML - 1.1log(R)	
Unit:	(cm-s)



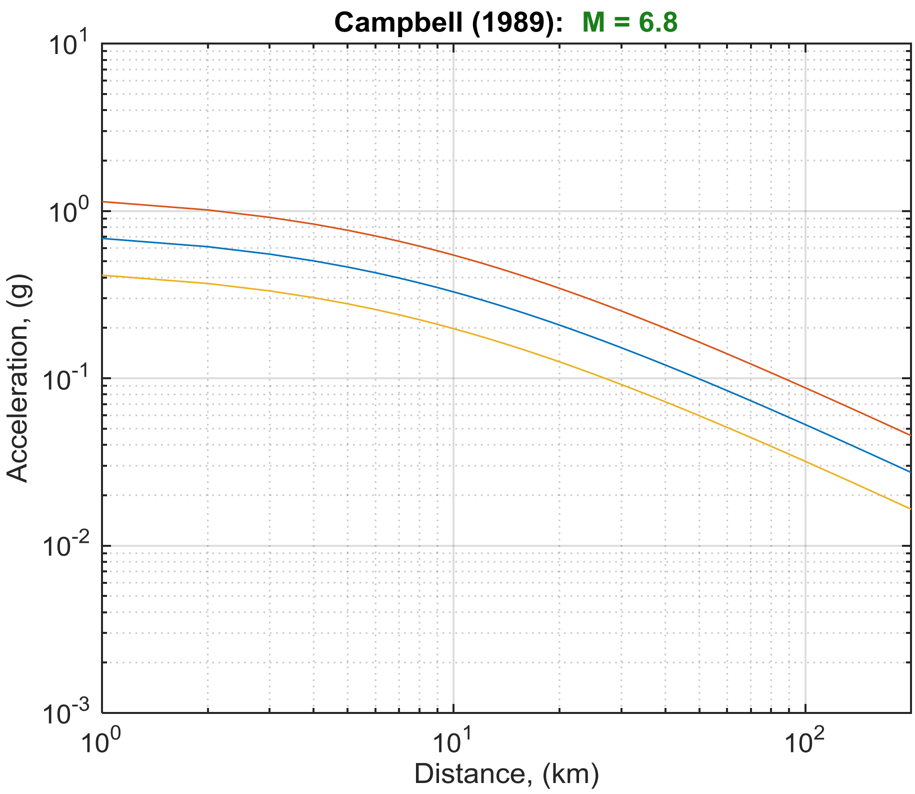
3. Amberseys (1990)

Amberseys (1990)	
log(Y) = -1.101 + 0.2615Mw - log(r) - 0.00255r	
Unit:	(g)



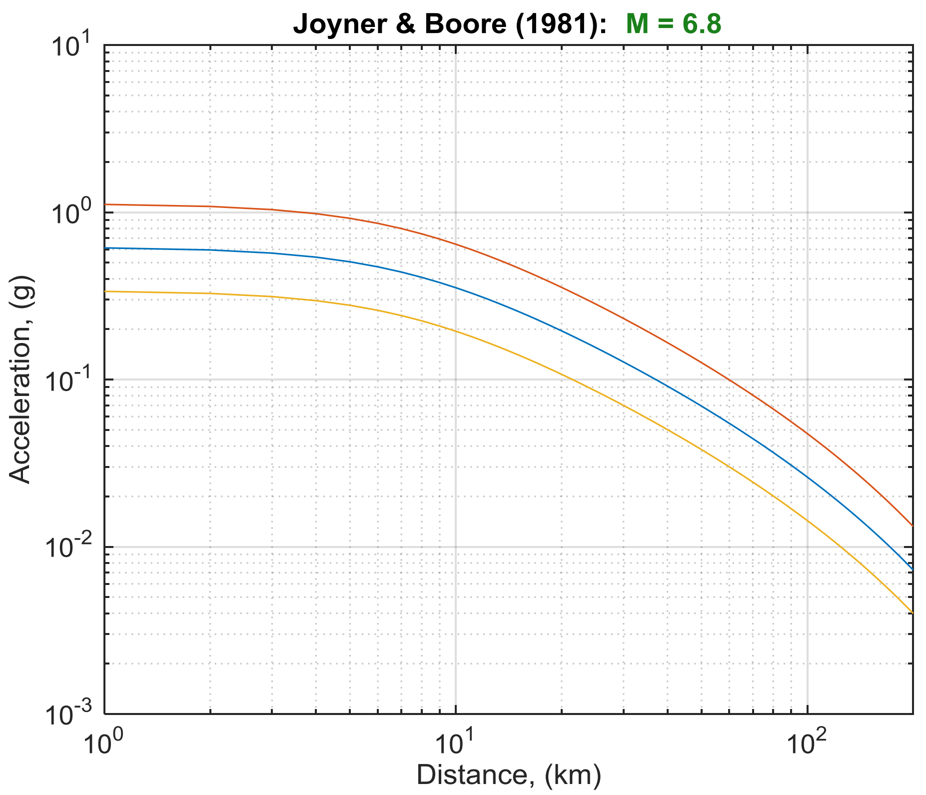
4. Campbell (1989)

Campbell (1989)	
ln(PHA) = -2.501 + 0.623ML - 1.0ln(R+7.28)	
Unit:	(g)



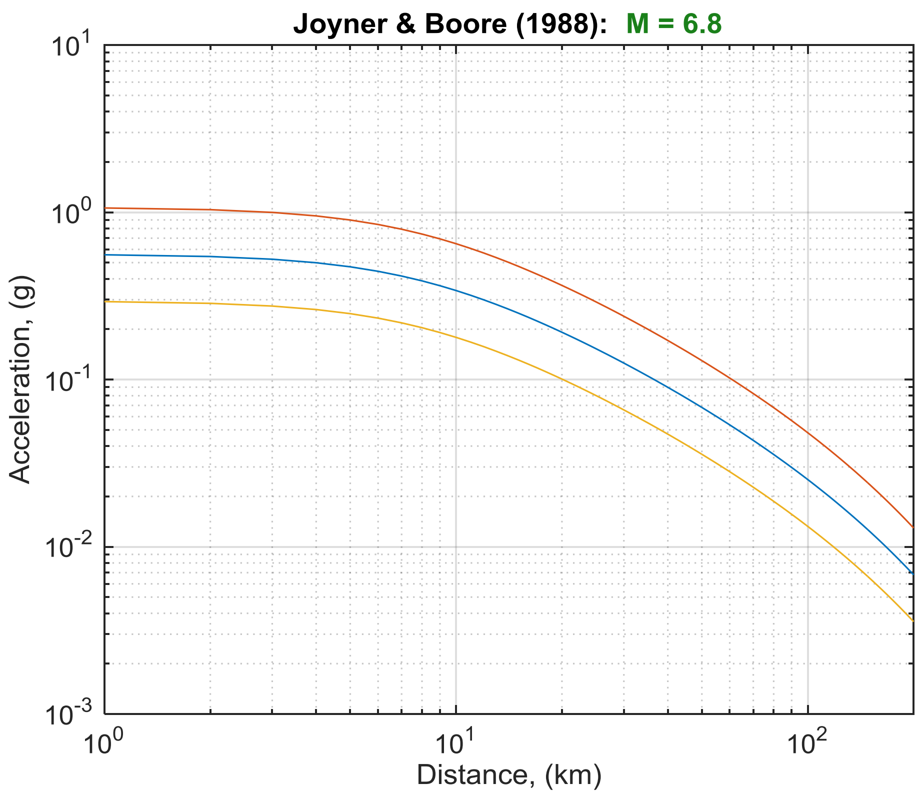
5. Joyner & Boore (1981)

Joyner & Boore (1981)	
log(y) = -1.02 + 0.249M - log(r) -0.00255r	
Unit:	(g)



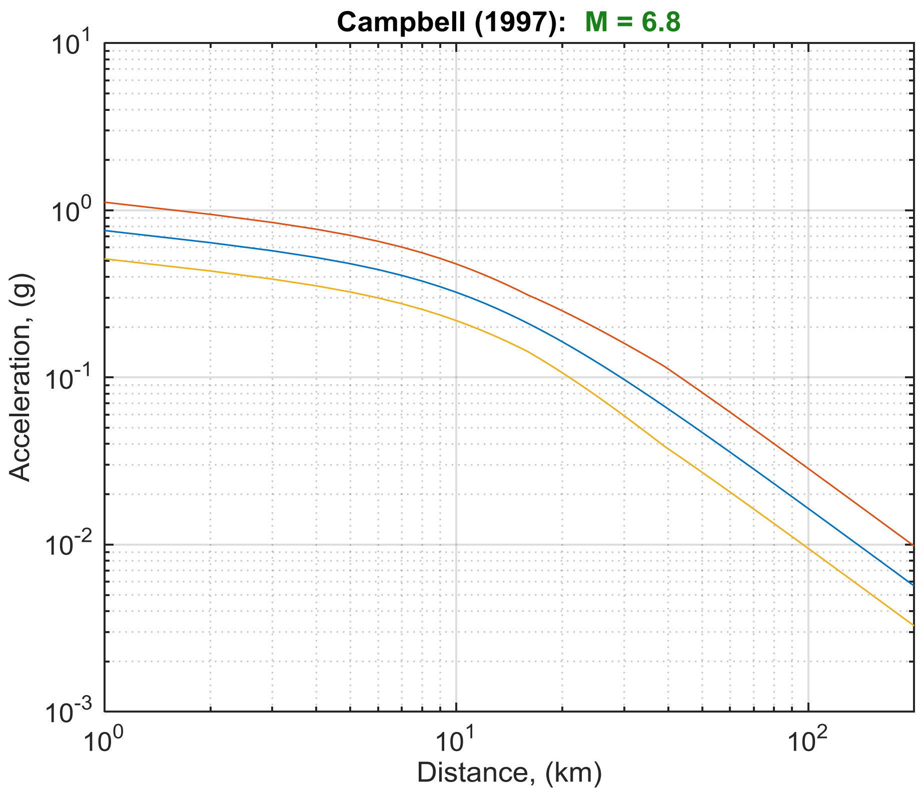
6. Joyner & Boore (1988)

Joyner & Boore (1988)	
log(y) = 0.49 + 0.23(M-6) - log(r) -0.0027r	
Unit:	(cm-s)



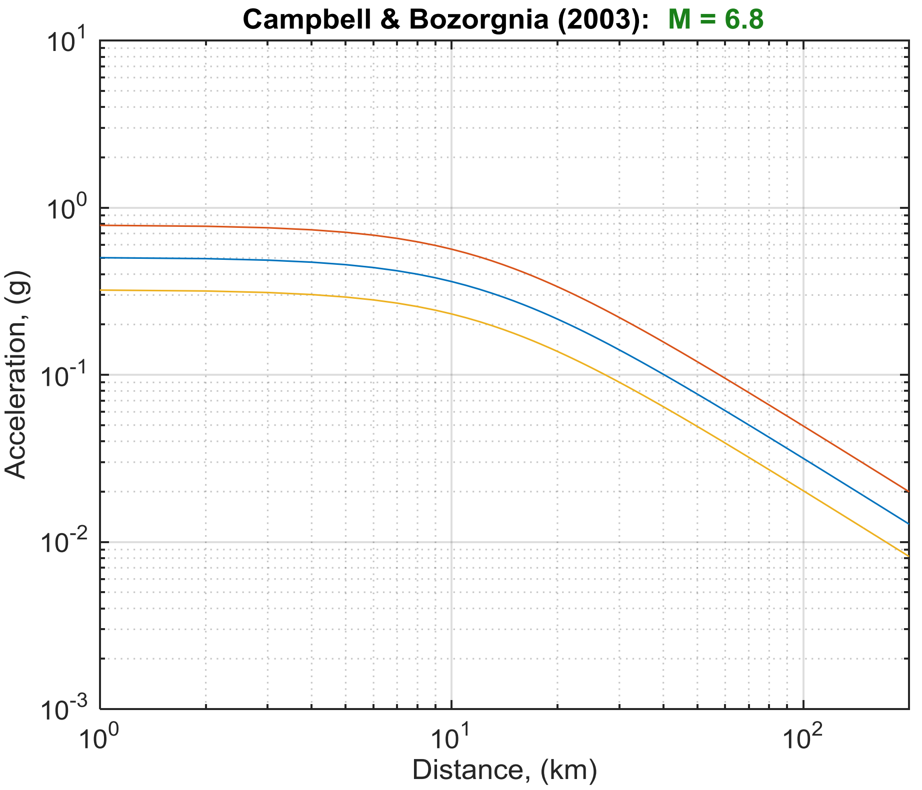
7. Campbell (1997)

Campbell (1997)	
ln(AH) = a1 + a2M + a3ln(sqrt(R^2+(a4exp(a5M))^2)) + (a6+a7ln(R)+a8*M)F + (a9+a10ln(R))SSR + (a11+a12ln(R))SHR	
Unit:	(g)



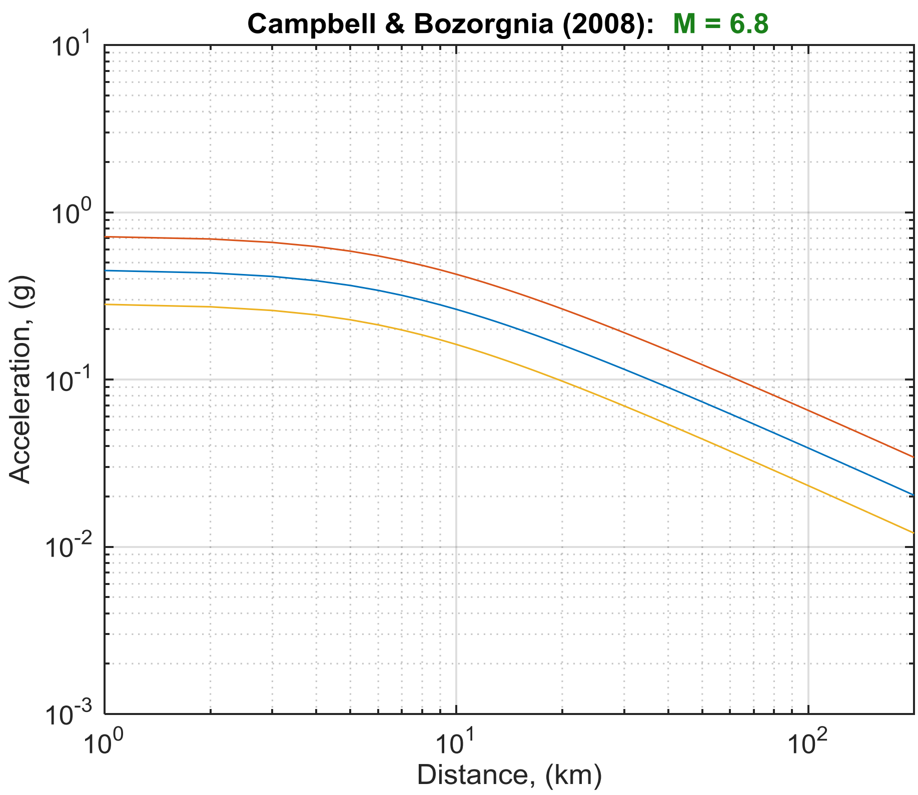
8. Campbell & Bozorgnia (2003)

Campbell & Bozorgnia (2003)	
ln(Y) = c1 + f1 + c4ln(sqrt(f2)) + f3 + f4 + f5	
Unit:	(g)



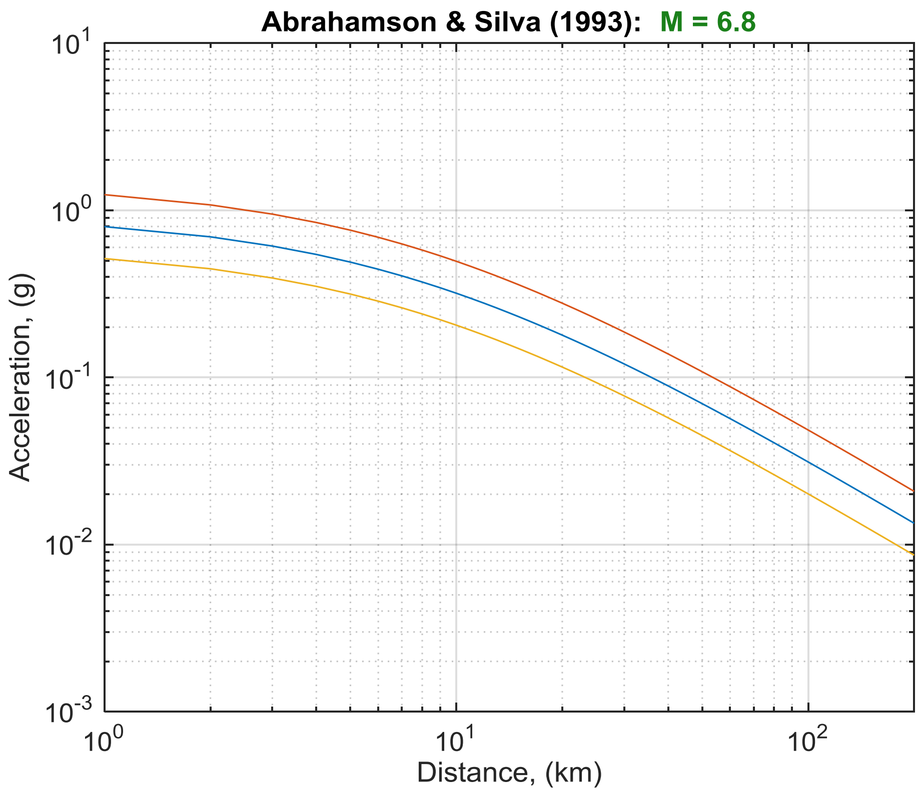
9. Campbell & Bozorgnia (2008)

Campbell & Bozorgnia (2008)	
ln(Y) = f_mag + f_dis + f_flt + f_hng + f_site + f_sed	
Unit:	(g)



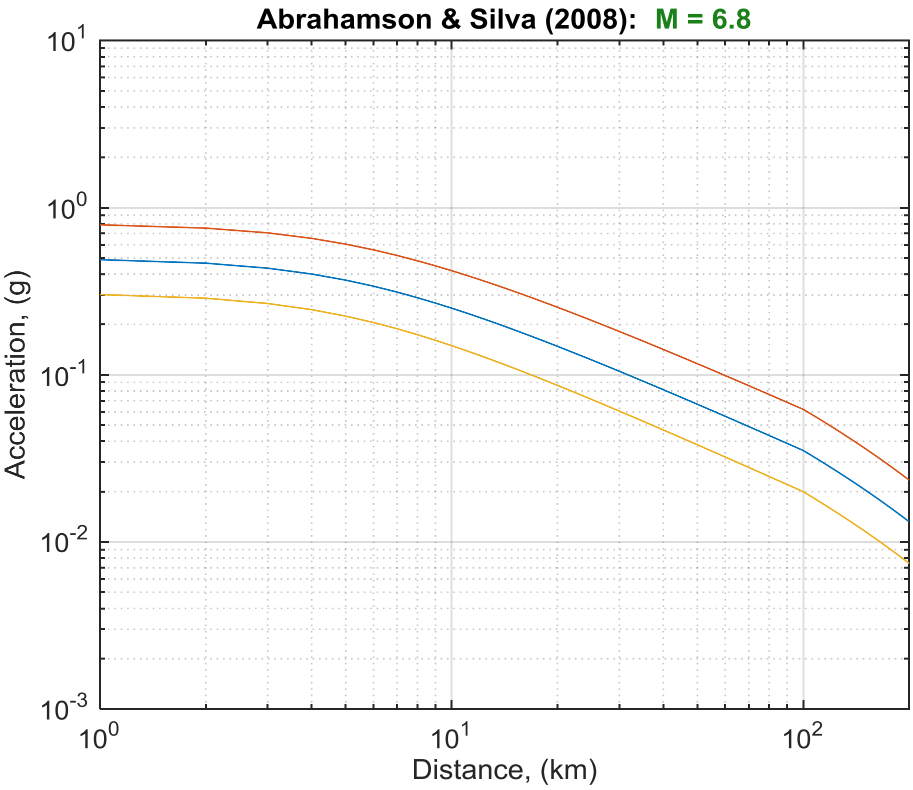
10. Abrahamson & Silva (1993)

Abrahamson & Silva (1993)	
ln(PGA)rock = θ1 + θ2M + θ3ln[r + exp(θ4 + θ5M)] + θ11F1 ln(PGA)soil = θ6 + θ7M + θ8ln[r + exp(θ9 + θ10)] + θ11F1	
Unit:	(g)



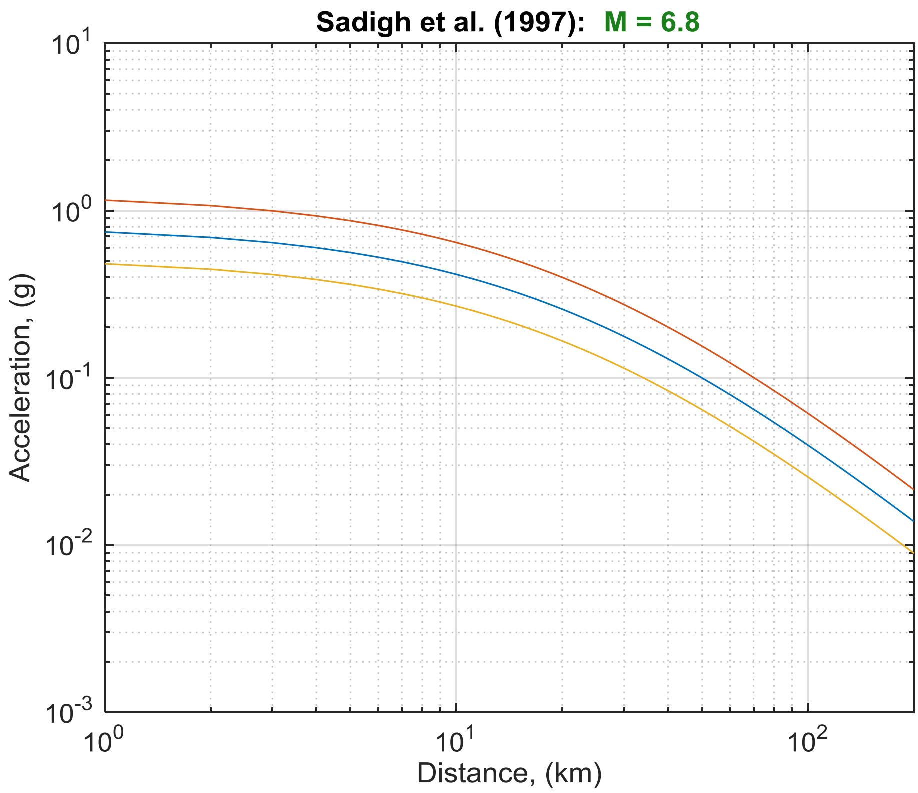
11. Abrahamson & Silva (2008)

Abrahamson & Silva (2008)	
ln Sa(g) = f1 + a12*FRV + a13*FNM + a15*FAS + f5 +FHW*f4 + f6 + f8 + f10	
Unit:	(g)



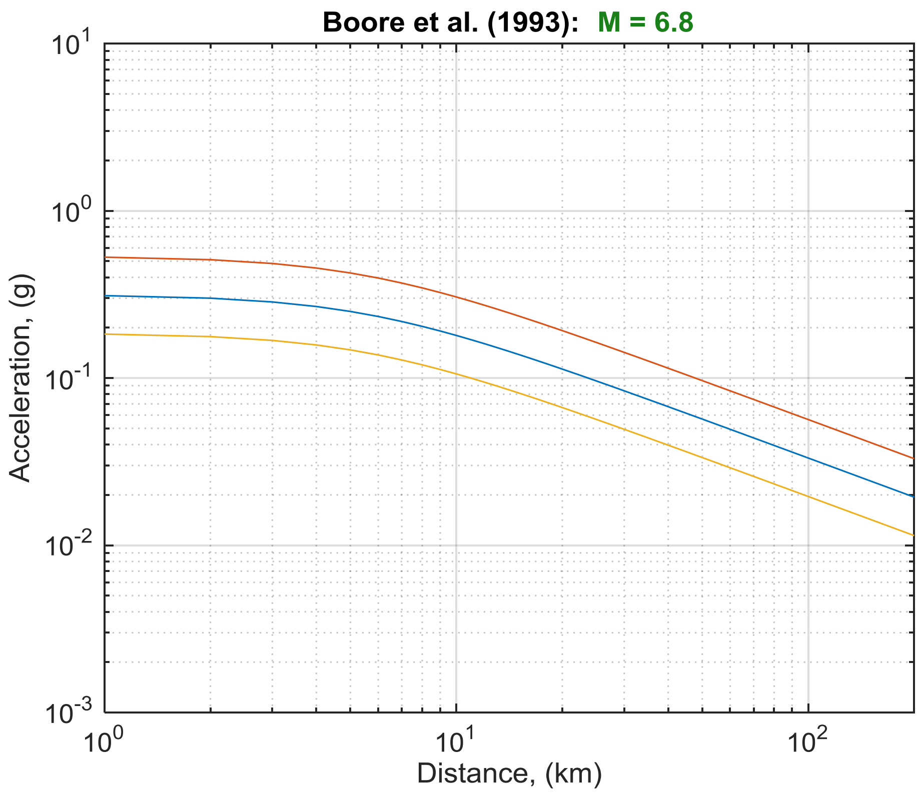
12. Sadigh et al. (1997)

Sadigh et al. (1997)	
ln(PGA) = C1 + C2*M + C3*ln(r_rup + C4*exp(C5*M))+ C6*ZT	
Unit:	(g)



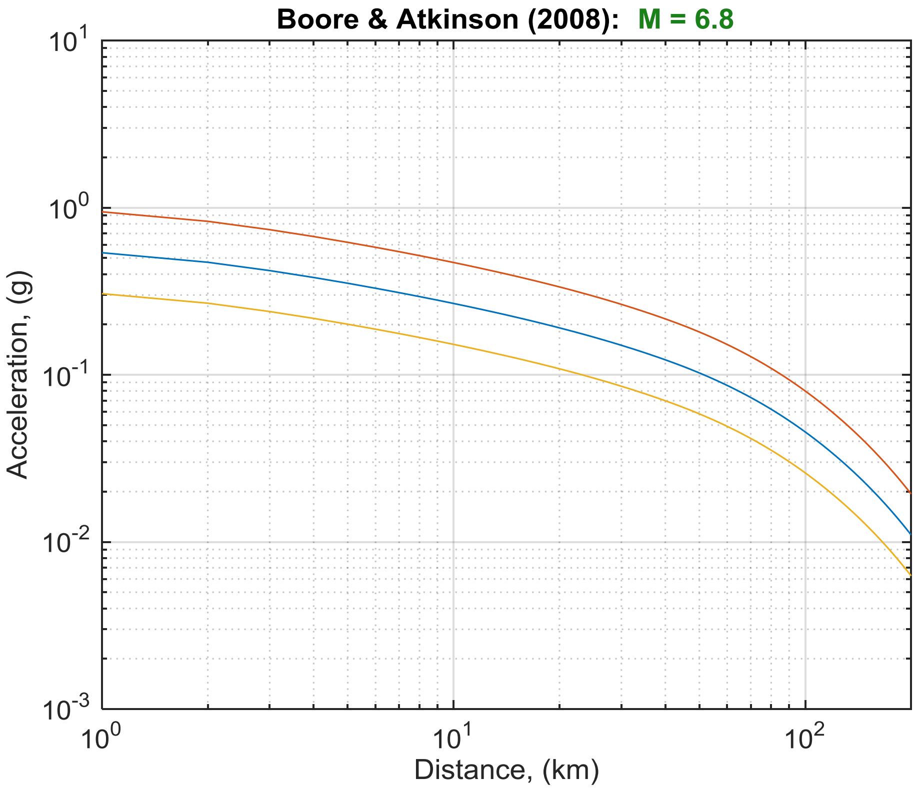
13. Boore et al. (1997)

Boore et al. (1997)	
log Y = b1 + b2(M-6) + b3(M-6)^2 + b4*r + b5*log(r) + b6*GB + b7*GC	
Unit:	(g)



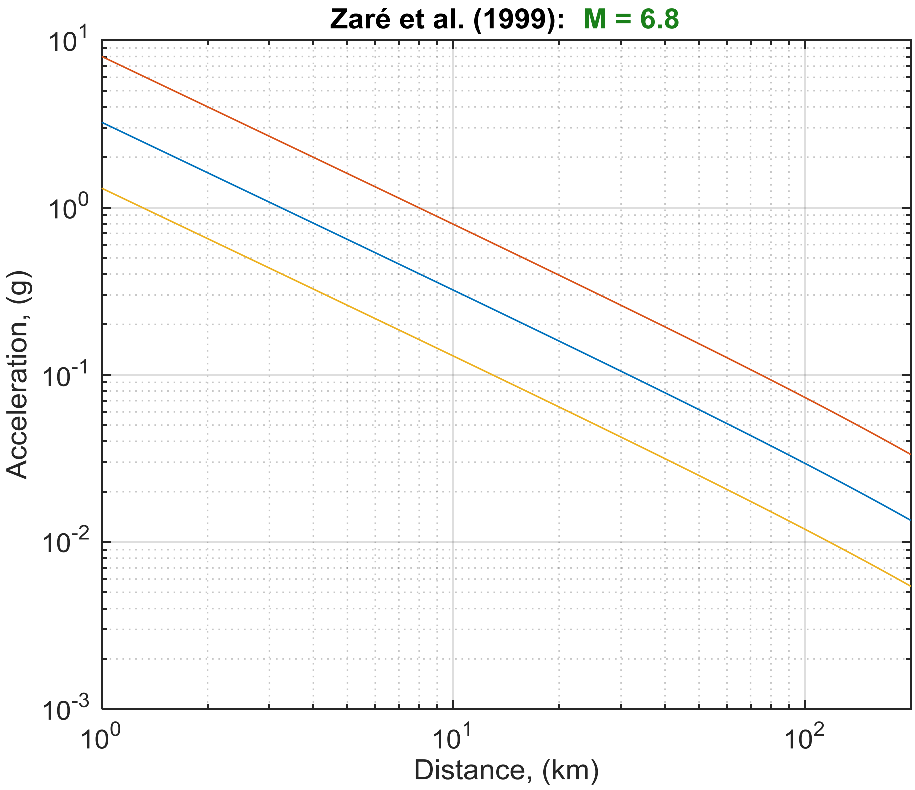
14. Boore & Atkinson (2008)

Boore & Atkinson (2008)	
ln(Y) = FM(M) + FD(RJB,M) + FS(VS30,RJB,M)	
Unit:	(g)



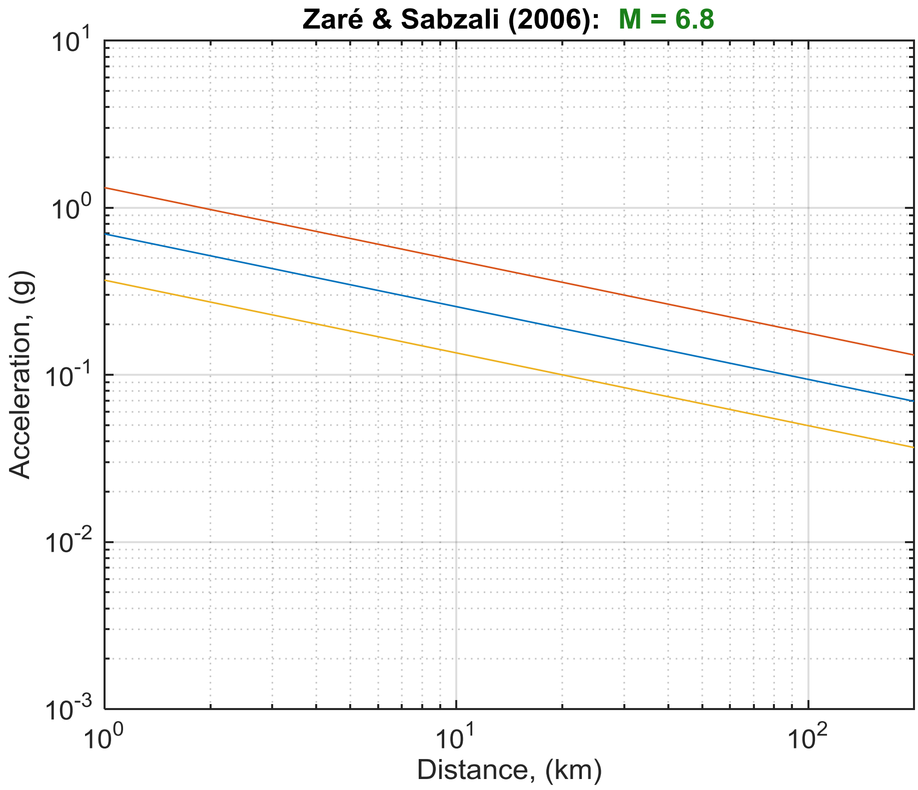
15. Zare et al. (1999)

Zare et al. (1999)	
log(A) = aM + bR - log(R)+ CiSi	
Unit:	(m-s)



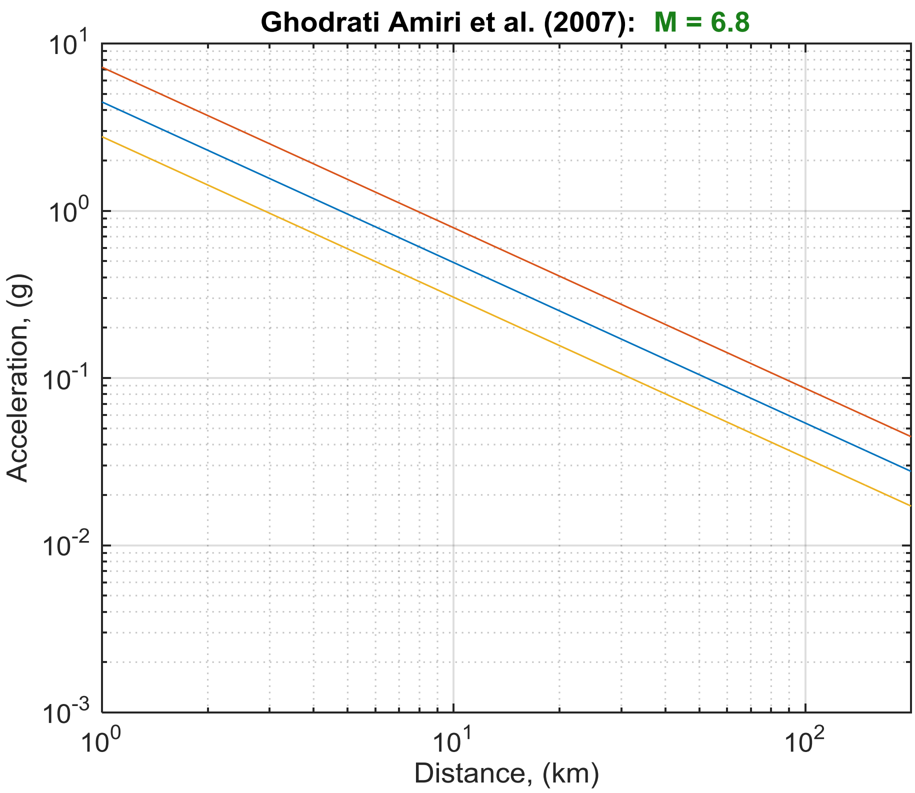
16. Zare & Sabzali (2006)

Zare & Sabzali (2006)	
log(PGA) = a1(T)M + a2(T)M2 + b(T) log(R) + CiSi	
Unit:	(g)



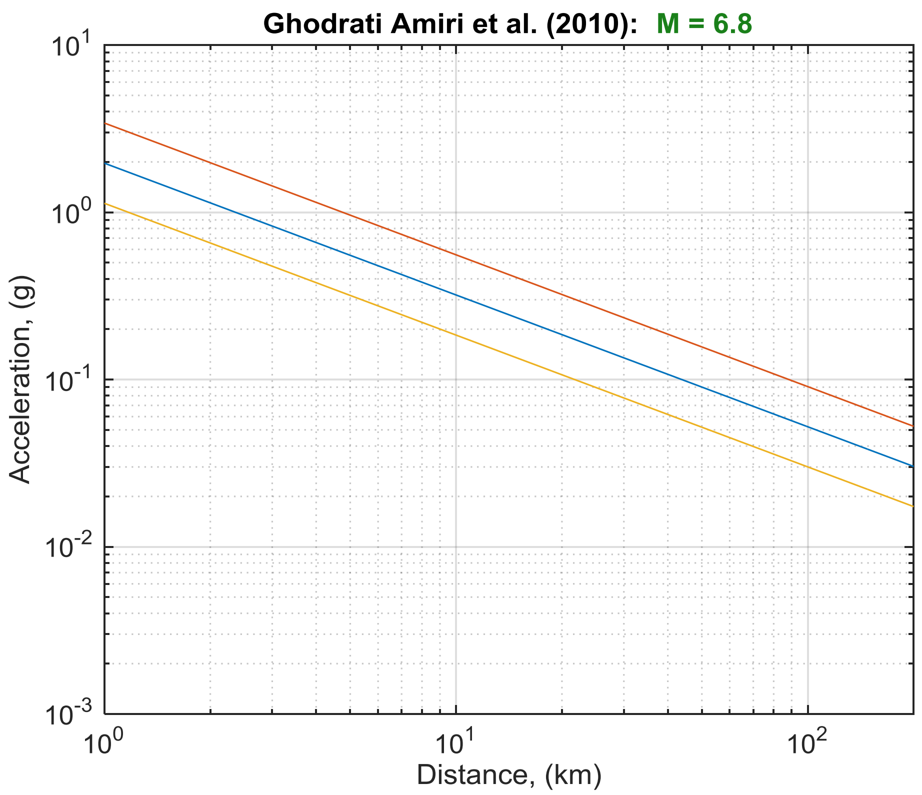
17. Ghodrati Amiri et al. (2007)

Ghodrati Amiri et al. (2007)	
ln(y) = C1 + C2Ms - C3ln(R+C4exp(Ms)) + C5R	
Unit:	(cm-s)



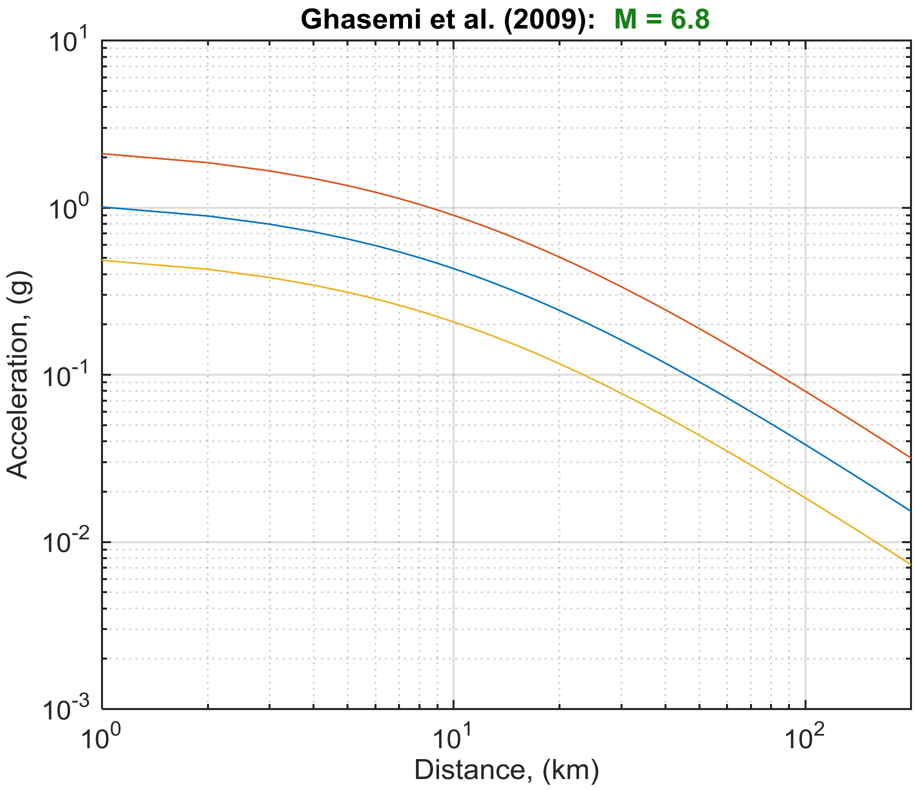
18. Ghodrati Amiri et al. (2010)

Ghodrati Amiri et al. (2010)	
log(SA) = C1 + C2Ms + C3 log(R)	
Unit:	(cm-s)



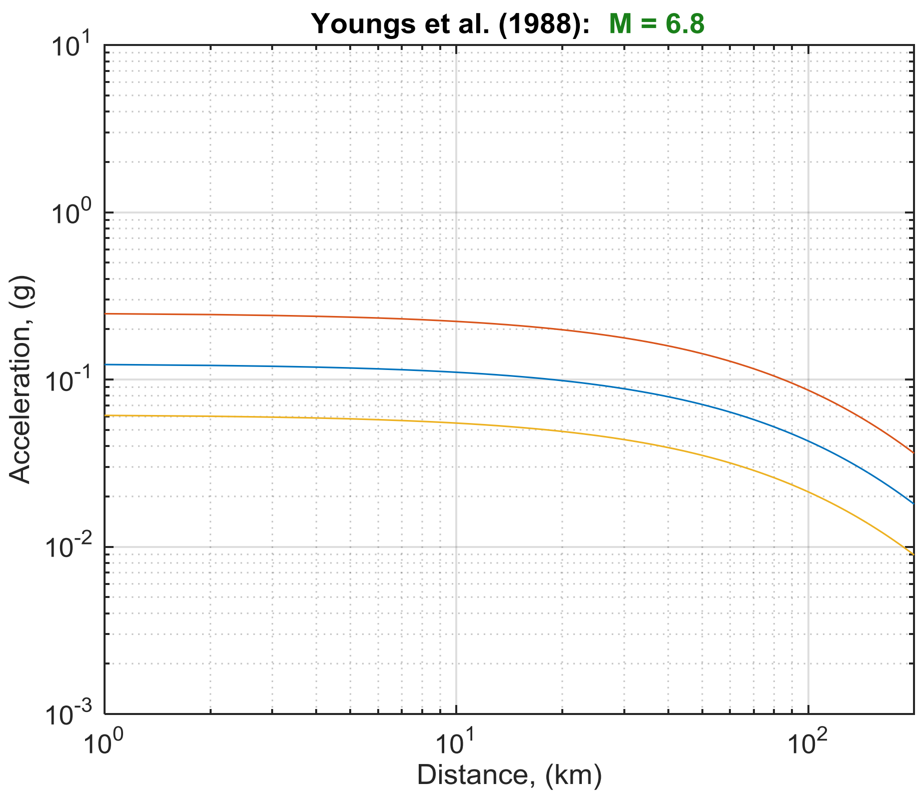
19. Ghasemi et al. (2009)

Ghasemi et al. (2009)	
log(Sa) = a1 + a2M + a3log(R+(a4 x 10^(a5M))) + a6S1 + a7S2	
Unit:	(cm-s)



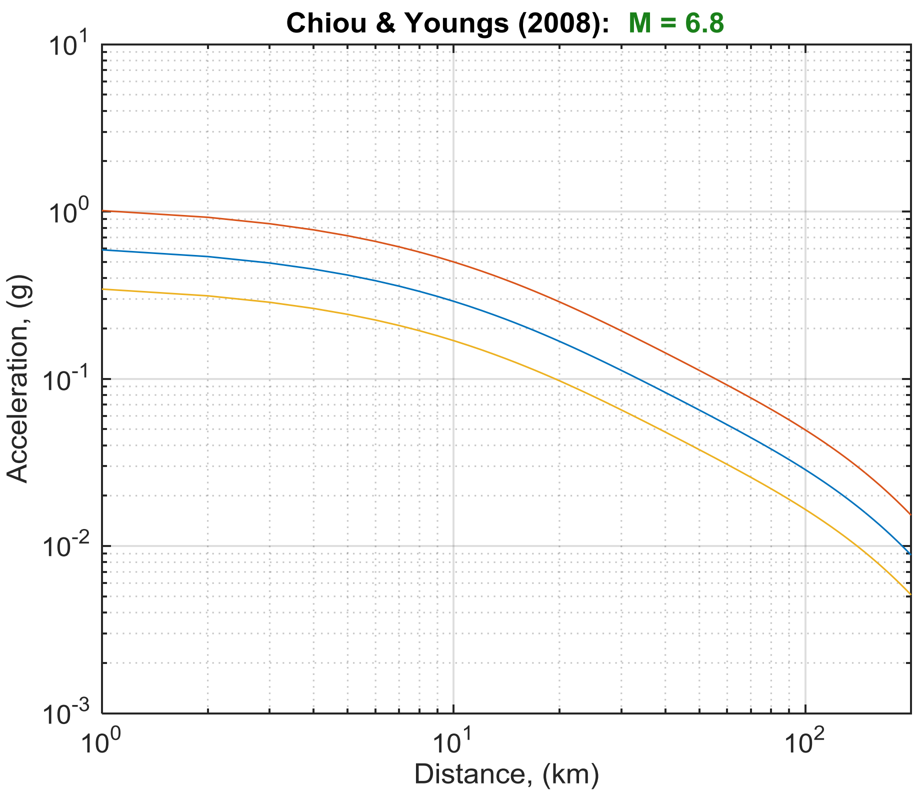
20. Youngs et al. (1988)

Youngs et al. (1988)	
$\ln(a_{max})$ = C1 + C2Mw - C3 ln[R + C4 exp(C5Mw)] + BZt	
Unit:	(cm-s)



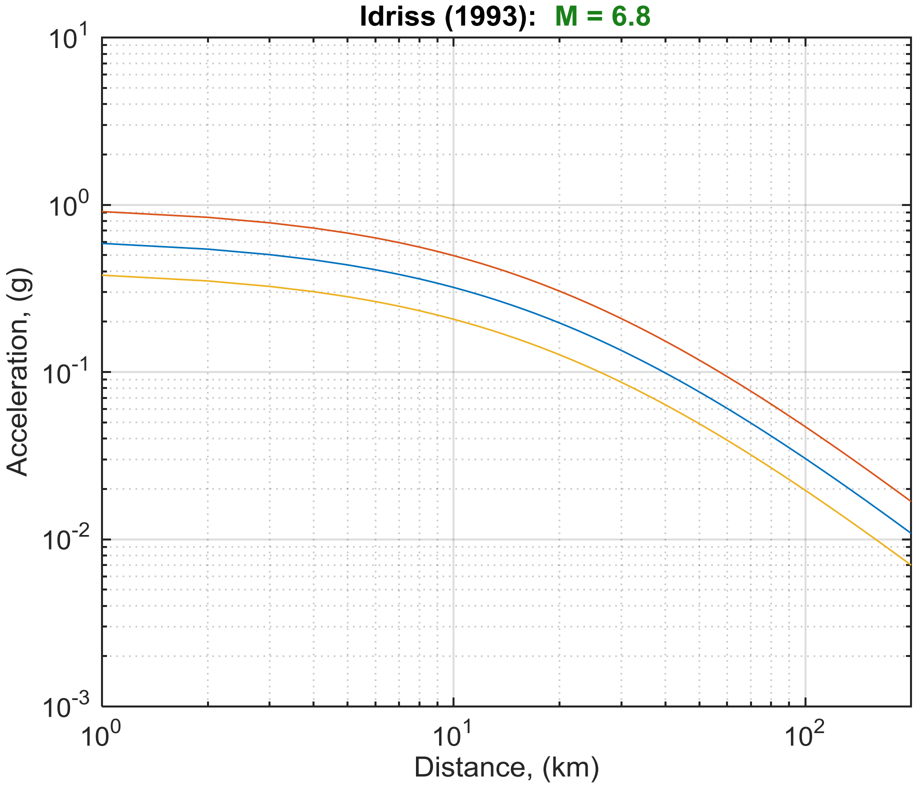
21. Chiou & Youngs (2008)

Chiou & Youngs (2008)	
ln(y) =	ln(yref) + φ1 min[ln(VS30/1130), 0] + φ2{exp(φ3[min(VS30,1130)-360]) - exp(φ3(1130-360))}*ln((yref*$e^{\eta i}$ + φ4)/φ4) + φ5{1 - 1/cosh[φ6*max(0,Z_1 - φ7)]} + φ8 cosh[0.15 max(0,Z1.0 - 15)]
Unit:	(g)



22. Idriss (1993)

Idriss (1993)	
ln(Y) = [a0 + exp(a1 + a2*M)] + [b0 - exp(b1 + b2*M)] ln(R + 20) + aF	
Unit:	(g)



REFERENCES

[1] Douglas, John. "Ground-motion prediction equations" 1964-2010. Berkeley, CA: Pacific Earthquake Engineering Research Center, 2011.

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