



HYBRID-EMPIRICAL GROUND MOTION MODELS FOR GEORGIA

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Ground motion prediction equations are essential for several purposes ranging from seismic design and analysis to probabilistic seismic hazard assessment. In seismically active regions without sufficient data to build empirical models, hybrid models become necessary. Georgia, despite being located in a region with moderate seismic activity, does not have sufficient strong ground motion data to build empirical ground motion models. In this study, we have applied the host-to-target method to two regions in Georgia with different source mechanisms: Javaxeti and Racha regions. According to the tectonic regime of the target areas, two different regions are been chosen as host regions. One of them is the North Anatolian Fault zone in Turkey with mostly strike-slip stress regime and the other is Tabas in Iran with mostly reverse mechanism. We performed stochastic finite-fault simulations in both host and target areas and employed the hybrid-empirical method of Campbell (2003). An initial hybrid empirical ground motion model is developed for PGA and SA at selected periods for Georgia. This model could be employed in various applications where use of ground motion prediction equations is required.

An application of these coefficients for ground motion models to be used in regional PSHA in Georgia is now in progress. Potential future research includes the test and use of such hybrid-empirical models for a variety of earthquake engineering purposes.

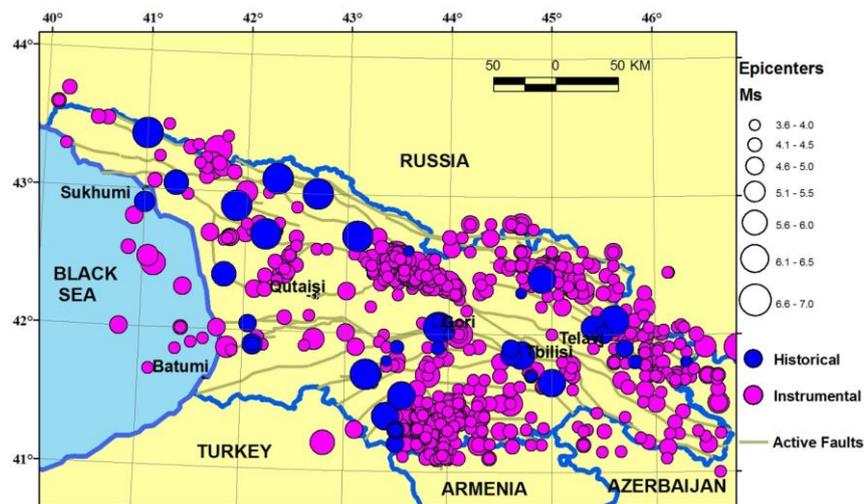


Figure 1. Map of instrumental and historical seismicity of Georgia

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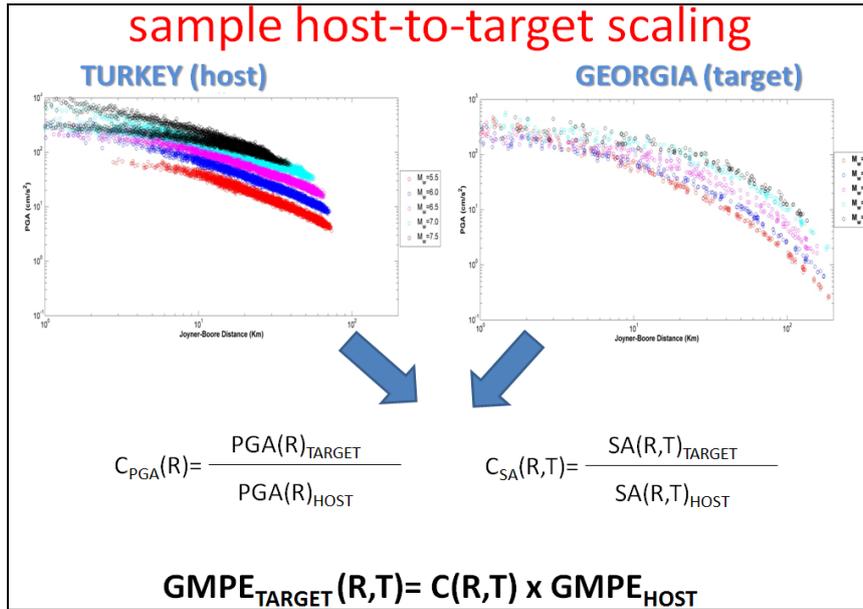


Figure 2. A summary of the host-to-target scalings for Georgia-Turkey application

Table 1. Simulation parameters used for the scenario simulations in host regions

Parameter	Tabas (Iran)	NAFZ (Turkey)
Magnitude- Fault size relationship	Wells and Coppersmith (1994)	Wells and Coppersmith (1994)
Stress drop- Fault size relationship	Mohammadioun and Serva (2001)	Mohammadioun and Serva (2001)
Geometric spreading model		
1st hinge in geometric atten.	30.0	30.0
2nd hinge in geometric atten.	100.0	100.0
1st slope in geometric atten.	-1.0	-1.0
2nd slope in geometric atten.	-0.6	-0.5
3rd slope in geometric atten.	-0.5	-0.5
$Q=Q_0.f^n$ (Q_0, n)	(53, 1.02)	Western (88, 0.9) Eastern (122, 0.68)
Duration model	$T_R+0.05R$	$T_R+0.05R$
Kappa	0.04	0.045 for soil 0.035 for rock
Beta (Vs) (km/s)	3.2	3.7
Density (gr/cm ³)	2.7	2.8
Rupture Velo./S-wave vel.	0.8	0.8
Windowing Function	Saragoni-Hart	Saragoni-Hart
Site amplifications	Generic	Local site functions

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