ESTIMATES OF VS100 AT SITES OF PRECARIously BALANCED ROCKS (1-073)
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In Purvance et al. (2008, Bull. SSA), the overturning fragilities of precariously balanced rocks (PBRs) were parameterized as a function of a vector of the ground motion intensity measures peak ground acceleration (PGA) and response spectra at 1 sec (Sa1). The resulting failure probabilities (OPs) for several of the PBRs were very high, suggesting they were inconsistent with the 2002 USGS ground motions. Previously, Vs30 values (measured shear velocity averaged to 30 meters depth) at PBR sites were surveyed with refraction microtremor arrays in order to correlate with PGA constraints (Pullammanappallil et al., 2005 SCEC; Purvance et al., 2008 SSA). Vs30 values slowness-averaged across the 13 sites to 664 m/s, between the 629 m/s Vs30 of the Boore and Joyner (1997) rock model, and the 760 m/s NEHRP B-C boundary Vs30, the value assumed in the “rock” site effects in the latest hazard maps. However, Sa1 values may be better correlated with deeper shear wave velocities. Here we examine measurements of Vs100 (average shear velocity to 100 meters depth) at a number of sites on granitic rocks, and compare them with the Vs100 values assumed to apply for the hazard maps, from Boore and Joyner (1997). The results indicate that on average, Vs100 values at granitic outcrop sites typical of PBRs are similar to or higher than assumed in the hazard maps. The 13 PBR sites show a slowness-averaged Vs100 of 1172 m/s. Only one of fifteen granitic sites had a Vs100 value lower than the 910 m/s Vs100 of Boore and Joyner’s average rock-site model. However, this site (Tooth) showed a Vs100 still at 96% of the Boore and Joyner model’s Vs100. The two sites showing maximum Vs100 measurements top out at 178% of the model rock Vs100. Thus, in applying an appropriate correction factor to the OP for a measured site, none of the 15 PBR and granitic sites would be expected to shake any harder than the model rock site. All but one of the sites would be expected to shake less intensely than the model rock site. However, the stiffest site of the 15 measured, Llano, would still shake at 75% the intensity of the Boore and Joyner (1997) model rock site, all other factors being equal. In sum, deeper shear velocities at PBR sites are not significantly different from what is predicted by the Boore and Joyner model.