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Improving the Italian strong ground motion attenuation relationship: preliminary results with an updated accelerometric data set

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Strong ground motion attenuation relationships are fundamental tools for seismic hazard evaluation. In Italy the most widely used attenuation relationship is the Sabetta and Pugliese (1987 and 1996, here afters referred to as SP96) for evaluating peak ground acceleration, peak ground velocity, Arias intensity and pseudovelocity response spectra, of the Italian territory. The equation has been derived using 95 records relative to 17 earthquakes with magnitude ranging from 4.6 to 6.8. The SP96 relation is based on the strongest events since the installation of accelerometric instruments in Italy, dated 1972, such as Friuli 1976, Valnerina 1979, Irpinia 1980, and Lazio-Abruzzo 1984, which is the most recent event. In the time span 1984 – 2007 other moderate seismic events occurred in Italy, namely the East Sicily 1991, Umbria-Marche 1997-1998, Pollino 1998 and Molise 2002, with moment magnitude > 5, and huge data sets have been obtained due to the installation of many temporary stations and digital instruments. The Umbria-Marche and Molise accelerometric data sets allowed the calculation of regional attenuation relationships that show a considerably different trend compared to the SP96. In this time span a project for an updated Italian accelerometric data base construction has been started with the aim of collecting all the acceleration time histories recorded since 1972 and re-evaluating, updating and improving event parameters, data processing and station geological/geotechnical characteristics.

The aim of this research is the implementation of a new weighted regression anal-

ysis with the expanded and updated database, including coefficients to model the magnitude-dependent decay rate, the faulting mechanism, the local site effects and the magnitude-dependent variance. In addition, the fit of the SP96 equation to the new accelerometric data set spanning from 1972 to 2004 is evaluated with the aid of different statistic techniques, in order to verify the need of deriving a new attenuation equation.