Earthquake Ground Effects and Recent Landscape Evolution in the Apennines

MICHETTI, ALESSANDRO MARIA, c/o ANPA, Via V. Brancati, 48, 00144, Roma, Italy

The integration of (a) the exceptional quality and quantity of historical observations, (b) the results of the recent extensive application of paleoseismological techniques for the study of active tectonic structures in central and southern Italy and (c) the geomorphic evidence, allow to recognize and quantify the seismic component in the Pleistocene and Holocene geomorphic evolution of the Apennines. The study of ground effects produced by moderate to strong earthquakes (among others, the ca. M7, 1703 Norcia and L'Aquila, ca. M7, 1805 Bojano, M7.0, 1915 Fucino, M6.9, 1980 Irpinia, M5.7 and 6.0, 1997 Colfiorito, and M5.6, 1998 Lauria, earthquakes) and paleoearthquakes along the Apenninic segmented belt of normal faults clearly shows that the threshold for surface faulting is M5.5 to 6.0. The tectonic rupture of the ground surface is systematically accompanied by a set of impressive secondary effects, including reactivation of "sackungen", liquefactions and disappearance of springs, which are commonly very well described in the historical reports. Important ground effects are mostly concentrated within intermountain tectonic basins. Trench investigations show that, in the Holocene, recurrence interval of surface faulting events ranges from few hundreds to few thousands of years, and normal fault slip-rates are in the order of 0.1 to 1.0 mm/yr. Short-term slip-rates are consistent with the long-term, Quaternary evolution footwall mountain fronts and hangingwall basins.

In the Apennines, like in many other regions of the earth, information on paleoseismicity provides therefore new perspectives for understanding the rates of tectonic processes and their signature in the landscape.