

Geophysical Research Abstracts, Vol. 9, 06442, 2007
SRef-ID:
© European Geosciences Union 2007



Evaluation of local site effects in the city of Sansepolcro (central Italy): preliminar results obtained by a urban seismic network.

F. Bergamaschi(1), R. M. Azzara(1)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Sismologia e Teonofisica, Osservatorio SismologiCo di Arezzo, Via Uguccione della Faggiuola, 3 52100 Arezzo, Italy

Sansepolcro, one of the most significant city of Tuscan Tiber Valley, is located in an area close to the eastern edge of the Upper Tiber Valley, characterized by a wide local seismicity, related to the Altotiberina Fault (ATF) activity and not far from the main seismogenic areas of Mid-Northern Apennines (Montefeltro, Forlì, Gubbio, etc.). The Upper Tiber Valley has felt in the past several strong earthquakes: in 1789 (VIII MCS in the city of Sansepolcro), in 1917 (> VIII MCS), in 1948 (> VII MCS), in 1964 (VII MCS). Furthermore, many seismic sequences took place in recent years (1987, 1990, 1997), the last one in 2001 (November, 26, 2001, $ML = 4.4$). From May 2005, some seismic stations have been deployed in the center of Sansepolcro and its vicinities. Five sites were covering different geologic environments, along a direction approximately orthogonal to the valley axis. The seismic array has recorded more than 100 local and regional seismic events. 20 seismic events, with magnitude ranging from 2.0 and 3.8, distributed with a good azimuthal coverage in an area of 150 km radius centered on the city, have been selected. They were recorded by all the seismic stations with a signal to noise ratio higher than 3 in the frequency band of interest (0.5-10 Hz). The selected events have been analyzed with HHSR and HVSR techniques, to obtain the average spectral ratios for each site. Moreover, we analyzed seismic ambient noise in order to evaluate HVNSR, to be compared with the curves obtained by earthquake analysis. The results allow to give a preliminar evaluation of amplification effects due to the surface geology in the urban area. The three average spectral ratios (HHSR, HVSR and HVNSR) provide a good agreement: they show peaks with a raising amplitude centered on frequencies which point to long period moving from east to the center of the valley. The good agreement with 1D theoretical transfer functions, ob-

tained from stratigraphic data and velocity downhole profiles (V_p e V_s), available for the monitored sites, suggests the hypothesis of being in geologic environment characterized by the presence of a stiff layer, identifiable in the well logs and in the velocity profiles obtained by downhole measurements, which seems to be the reason of surface amplification effects. This layer mainly made by firm cobble-stone associated to the sedimentary phases of Afra torrent, a Tiber tributary that flows close to the SE border of the city, is characterized by shear waves velocities comparable with those of a bedrock and it is recognizable in all the locations, at depths that increase from few meters to 100 m, moving from east to west. This layer, that seems to determine the distinct impedance contrast with the fluvial-lacustrine superficial layers, is not bottom of the basin which should be at a depth of more than 1000 m, as shown by the results of recent 3D analysis (Ciaccio e Barchi, 2006).

Bibliography

Ciaccio, M.G., Barchi M.R., 2006: The geometry of the Alto Tiberino Basin, Geophysical Research Abstract, Vol. 8, 07082, EGU 2006