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SITE EFFECTS IN THE TOWN OF AVELLINO (SOUTHERN ITALY) FROM SEISMIC NOISE AND MACROSEISMIC DATA.

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We present the results of a survey conducted in the town of Avellino, in Southern Italy, in order to study the seismic site response. Avellino is located near the Apennine Chain, in the Irpinia Region. This sector of the chain is characterized by high seismic hazard. Avellino has been damaged seriously and repeatedly by strong earthquakes with a magnitude greater than 6.0, which occurred in Irpinia (1732, 1930, 1980), in the Sannio (1688) and in Molise (1805) Regions. At present, the area is affected by background seismic activity, including moderate sized events (1990, M = 5.4, 1991 M = 5.1, 1996 M = 5.1), (Cocco et al., 1999; Weber et al., 2007).

Avellino lies at the external border of the calcareous Apenninic nappes, in a structural depression filled with terrigenous deposits, overlain by Quaternary formations. The geology and the geometry of the surface deposits are very complex, because of the lack of a unique rock basement and the presence of filling sediments, which are characterised by different physical properties. A detailed geological map of the urban area, together with geognostic boreholes and seismic down-holes, allowed us to define the surface geological structure.

Ambient vibrations measurements were performed on a grid of 31 points with a spacing of 400-600 meters. Two profiles consisting of 7 and 12 stations, respectively, with spacing of 50-100 m were performed, in order to investigate in detail two sectors of the historical town. Three velocimetric, triaxial, 0.1-256 Hz, TROMINO / Micromed stations were used, with GPS system for time synchronization, and sampling frequency of 128 cps. All measurements have lasted at least 40 minutes. Spectral ratio between the horizontal and the vertical components of the seismic noise (HVSR) were computed using Geopsy code, which applies an anti-trigger algorithm for windows selection. Contour maps of peak frequency and maximum amplitude in the HVSR curves were produced. HVSR measurements executed in Avellino from a previous work (Maresca et al., 2012) were also used for contouring.

We also drew up a detailed damage map, related to two strong earthquakes which occurred in Irpinia and struck Avellino: the November 23, 1980 (Mw = 6.9), and the November 29, 1732 (X- XI MCS , M = 6.6) earthquakes. Finally, we integrated all the results from the different types of data to identify any correlations among them which can be explained in terms of site effects.

REFERENCES

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Cocco M, Chiarabba, C, Di Bona M, Selvaggi G, Margheriti L, Frepoli A, Lucente FP, Basili A, Jongmans D, Campillo M (1999) " The April 1996 Irpinia seismic sequence: evidence for fault interaction", *Journ. Seismol.*, 3: 105-117.

Maresca, R, Nardone, L, Pasquale, G, Pinto, F, and Bianco, F (2012) "Effects of surface geology on seismic ground motion deduced from ambient-noise measurements in the town of Avellino, Irpinia region (Italy)", *Pure Appl Geophys*, 169: 1173-1188.

Weber E, Convertito V, Iannaccone G, Zollo A, Bobbio A, Cantore L, Corciulo M, Di Crosta M, Elia L, Martino C, Romeo A, Satriano C (2007) "An advanced seismic network in the southern Apennines (Italy) for seismicity investigations and experimentation with earthquake early warning", *Seism. Res. Lett.*, 78: 622-634.