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Abstracts

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Analysis of the seismic potential in Italy for
the evaluation of the seismic hazard

Evaluation of Local Amplification Effects: Some Results from the Maiella Area

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The 1706 Maiella earthquake is one of the most strong events characterizing the seismic history of Abruzzo, but yet several doubts exist about its seismogenic source. The macroseismic field of this event, with $I_0=IX-X$ MCS, is characterised by a singular pattern of intensities. The highest values ($I_{max}=X-XI$ MCS) correspond to the northern and southern terminations of the Maiella anticline; the Santo Spirito hermitage has $I=VI-VII$ MCS, although it is the nearest site at the macroseismic epicentre; the intensity does not diminish regularly with distance. Also others earthquakes with different epicentres, like the 1984 Val di Sangro one, have similar anomalies. In order to evaluate the local seismic response of those sites where the earthquake had caused severe damages ($\geq IX$), several investigation were carried out. Geophysical, geotechnical and geologic data have been collected. A field survey of ambient seismic noise has been made for all sites, both reprocessing data acquired previously and recording new data. Nakamura's method has been applied in order to obtain H/V spectral ratio curve for every site. These curves represent at first order the transfer functions of sites, providing their fundamental frequency of resonance, but not their amplification factor. A large number of H/V curves obtained shows a sharp pick at the fundamental frequency, indicating strong impedance contrasts at depth. These results have been roughly correlated with the available geotechnical data and the geological condition surrounding the sites. A 2D numerical analysis of the seismic local response working with boundary elements has been made only for Manoppello and Palena localities. After constructing a 2D geo-lithological model associated with a seismic velocity model for every site, the interaction between the seismic radiation associated with a plane wave and the superficial geology has been simulated. Of all synthetic seismograms obtained, the twenty signals corresponding to the villages and that one corresponding to the reference site on outcropping bedrock have been chosen along the two section in order to calculate average transfer functions. By comparing the H/V spectral ratio curves of seismic noise with the transfer functions calculated, a good correspondence can be found in the estimated fundamental frequencies of resonance in both cases. Because Serramonacesca has a geo-lithological model and an H/V spectral ratio curve of seismic noise very similar to those of Manoppello, located near it, it can suppose that seismic amplification effects characterize a region wider than single sites.