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Seismic Passive Prospecting techniques as a useful tool during destructive earthquakes

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After the 2009 Abruzzo earthquake (Italy) several surface geophysical surveys were performed to support emergency microzonation studies. The most used technique was the Horizontal-to-Vertical Spectral Ratio applied to seismic ambient noise. More than 200 ambient vibration recordings were performed by using the Horizontal-to-Vertical Spectral Ratio approach. This survey was performed using the same kind of equipment, acquisition, processing, data analysis and reliability test.
To verify the site response obtained by seismic ambient noise in Navelli, Castelnuovo and San Gregorio we installed a temporary accelerometric network. The stations were continuously operating for a period from few days to more than a month after the mainshock, allowing the recording of hundreds of seismic events with magnitudes from about 1 to more than 5.
In order to reconstruct the geological settlement of the study areas, the passive/active seismic prospections were integrated by electric and gravimetric surveys, detailed geology surveys and down-hole seismic measurements. The availability of such a large and homogeneous data-base, allowed us to carry out some 1-D geological models which corroborate the capability of seismic ambient noise to assess soil response and to detect the shallow subsurface geological and structural setting, the geometry of the lithological units, their mechanical and dynamical properties and the soil-structure interaction.