Geophysical Research Abstracts
Vol. 12, EGU2010-5101-2, 2010
EGU General Assembly 2010

The lost church of Montemurro (Basilicata, Italy): Ground Penetrating Radar and Electrical Resistivity Tomography for detecting its buried remains in S. Maria Square.

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Montemurro is a little centre town located in the Agri Valley (Basilicata Region, Italy) which was affected by two catastrophic events: in the 1842 a very large landslide has damaged great part of the centre and in the 1857 the town was destroyed completely by the "Great Neapolitan Earthquake" (Mallet, 1862), a seismic event having epicenter in the Agri Valley (Cello et al., 2003; Bavusi et al., 2004). Signs of those tragic events can be still found in the fabric of the city. One of these is certainly S. Maria square, a place suspected to house a church before the disastrous events of 1842. This suspicion is supported by a series of evidences: a historical drawing, dating back to before 1842, shows a church in position compatible with the location of the square; in aerial view S. Maria square appears as tear in the fabric of the city; the tales of the erderlies of Montemurro speak about an ancient missing church in the town. Then, in the attempt to resolve the doubt about the presence of the church, a geophysical survey was planned in S. Maria Square with the aim to detect some buried masonry structures related to the church. In this work we selected two active techniques such as the Ground Penetrating Radar (GPR) and the Electrical Resistivity Tomography (ERT). Sixty parallel GPR profiles 0.5 m spaced were gathered in S. Maria Square and in a contiguous street by using a GSSI SIR3000 system with a central frequency antenna of 200 MHz. Processed radargrams showed numerous reflectors and heterogeneities in the subsoil related to manmade objects. Then, a laborious data processing (Nuzzo et al., 2002) allowed to obtain several time-slices showing noticeable reflections compatible with masonry structures. Moreover, two ERT profiles were carried out by using an IRIS Syscal R2 system equipped with a multielectrode cable. The first ERT profile 86 m long and having 44 electrodes 2 m spaced allowed to investigate up to 9 m of depth. The second, overlapped on the previous one in the central part and constituted by 48 electrodes 1 m spaced for a length of 47 m, allowed to investigate up to about 4.5 m. Both Wenner and dipole-dipole sequences gathered along two arrays were inverted by using Res2DInv software (Loke and Barker, 1996). They showed several shallow high resistive nuclei. Their positions are in good agreement with those of the reflectors showed in the radargrams and time slices. Joint interpretation of GPR and ERT results suggests the presence of cavities and manmade structures under the square.

Acknowledgements
This work was supported by the traffic policeman, the technicians, the workers and the mayor Mario Di Sanzio of the Commune of Montemurro.

References
Bavusi M., Chianese D., Giano S.I., Mucciarelli M. (2004). Multidisciplinary investigations on the Roman aqueduct of Grumentum (Basilicata, Southern Itlay). Annals of geophysics, 47 (6), 1791-1801.
Cello G., , Tondi E., Micarelli L. and Mattioni L. (2003). Active tectonics and earthquake sources in the epicentral area of the 1857 Basilicata earthquake (southern Italy). Journal of Geodynamics, 36 (1,2), 37-50.
Loke M.H., Barker R.D., (1996). Rapid least-square inversion of apparent resistivity pseudosections using a quasi-Newton method. Geophysical Prospecting, 44, 131 -152.
Mallet R. (1862) – Great Neapolitan Earthquake of 1857. London 1862, 2, Chapmann and Hall.