



Seismic noise at Solfatara Volcano (Campi Flegrei): acquisition techniques and first results for the definition of the shallow crustal structure

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In the period 2-6 April 2007 a seismic survey was carried out at Solfatara Volcano, (Campi Flegrei, Southern Italy) with the aim of inferring the shallow structure and evaluating local site effects.

Five circular seismic arrays equipped with 1-Hz 3-component Mark LE3Dlite sensors, were installed in the Solfatara crater. Each array consisted of 4 sensors, 3 of them evenly spaced (120°) around the circumference and the fourth placed at its center. The arrays were designed with radii of 5, 10, 25, 50 and 100 m. Some stations of the arrays shaped two orthogonal profiles of about 250-m-length, roughly oriented in the N-S and E-W directions. A further seismic station was installed outside the crater, on the Eastern rim.

The particular geometry of the station deployment was adopted to apply the spatial autocorrelation technique (Aki, 1957) and its modifications (MSPAC, Bettig et al., 2001, CCA, Cho et al., 2004), to the data recorded by each array and to infer shear-wave velocity models for different areas of the crater. Further information about the shallow structure will come from the application of Nakamura's technique (1989) to microtremor recorded at each sampled site. The two orthogonal profiles oriented N-S

and E-W will be useful to map possible variations of the resonance frequencies and amplification values along the N-S and E-W directions.

The results of the preliminary spectral analysis of some samples of seismic noise recorded during the 2-6 April 2007 survey at Solfatara Volcano, are already indicative of differences among the spectral content of the microtremor recorded in different areas of the crater. In particular the most evident differences are observed between the recordings of the stations located in the central part of the crater and those deployed in the Northern and Eastern areas. Moreover, the seismic noise recorded outside the crater has spectral characteristics that are very different from those observed for the array stations.

The observed differences in the spectral content of the seismic noise could be due both to the presence of horizontal velocity contrasts and to variations of the thickness of the shallower layers.

The high density of the deployment and the large number of the sampled sites will allow to obtain a detailed shallow velocity structure, to investigate about the presence (or not) of lateral heterogeneities and to map resonance frequencies and amplifications values in different areas of the crater.

References

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