Geophysical Research Abstracts
Vol. 18, EGU2016-11719, 2016
EGU General Assembly 2016

4-D imaging and monitoring of the Solfatara crater (Italy) by ambient noise tomography

Marco Pilz (1), Stefano Parolai (2), Heiko Woith (2), Marceau Gresse (3), Jean Vandemeulebrouck (3,4)

(1) Swiss Seismological Service, ETHZ Zurich, Switzerland (pilz@gfz-potsdam.de), (2) Deutsches GeoForschungsZentrum GFZ, Potsdam, Germany (heiko.woith@gfz-potsdam.de), (3) Université de Savoie, ISTerre, Le Bourget du Lac, France (marceau.gresse@gmail.com), (4) CNRS, ISTerre, Le Bourget du Lac, France (Jean.Vandemeulebrouck@univ-savoie.fr)

Imaging shallow subsurface structures and monitoring related temporal variations are two of the main tasks for modern geosciences and seismology. Although many observations have reported temporal velocity changes, e.g., in volcanic areas and on landslides, new methods based on passive sources like ambient seismic noise can provide accurate spatially and temporally resolved information on the velocity structure and on velocity changes. The success of these passive applications is explained by the fact that these methods are based on surface waves which are always present in the ambient seismic noise wave field because they are excited preferentially by superficial sources. Such surface waves can easily be extracted because they dominate the Green′s function between receivers located at the surface.

For real-time monitoring of the shallow velocity structure of the Solfatara crater, one of the forty volcanoes in the Campi Flegrei area characterized by an intense hydrothermal activity due to the interaction of deep convection and meteoric water, we have installed a dense network of 50 seismological sensing units covering the whole surface area in the framework of the European project MED-SUV (The MED-SUV project has received funding from the European Union Seventh Framework Programme FP7 under Grant agreement no 308665). Continuous recordings of the ambient seismic noise over several days as well as signals of an active vibroseis source have been used. Based on a weighted inversion procedure for 3D-passive imaging using ambient noise cross-correlations of both Rayleigh and Love waves, we will present a high-resolution shear-wave velocity model of the structure beneath the Solfatara crater and its temporal changes. Results of seismic tomography are compared with a 3-D electrical resistivity model and CO_2 flux map.