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Application of seismological techniques to volcanic environments: shear-wave velocity models and seismic sources in Campanian volcanic areas (Vesuvio and Campi Flegrei).

M. Guidarelli (1), A. Zille (1), A. Saraò (2), M. Natale (3), C. Nunziata (3), and G.F. Panza (1,4)

(1) Dipartimento di Scienze della Terra, Università di Trieste, Italy, (2) Osservatorio Vesuviano - Istituto Nazionale di Geofisica e Vulcanologia, Napoli, Italy, (3) Dipartimento di Geofisica e Vulcanologia, Università Federico II, Napoli, Italy, (4)The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy

We present a comparative study about the shear-wave velocity models and seismic sources in the Campanian volcanic areas of Vesuvio and Campi Flegrei.

The velocity models for the Vesuvio and Campi Flegrei volcanic areas are obtained through the non-linear inversion of surface-wave tomography data, using as a priori constraints the relevant information in literature. Local group velocity data, obtained by means of Frequency-Time Analysis, in the period range 0.3-2s, are combined with group velocity data, in the period range 10-35s, obtained from regional events, located in the Italian peninsula and bordering areas, and two station phase velocity data in the period 25-100s. To invert Rayleigh wave dispersion curves we apply the non-linear inversion method, called hedgehog. In this way we retrieve average models for the first 30-35 km of the lithosphere, the lower part of the upper mantle being kept fixed on the base of existing regional models. A feature, common to the two volcanic areas, is a low V_s layer, centred at about 10 km of depth, while, outside of the cone, along a path in the north eastern Vesuvian area, this layer is absent. This low velocity can be reasonably associated to the presence of partial melting and therefore may represent a quite diffused crustal magma reservoir, which is fed by a deeper one, with regional character, located in the uppermost mantle.

The decomposition of the seismic moment tensor into double couple (DC), compensated linear vector dipole (CLVD), and volumetric (V) components is very suitable to investigate the physical processes within a volcano, related to magma or fluid movements. Although for many events the percentage of DC is high, our results show the presence of significant non-DC components for the events of the Vesuvio and Campi Flegrei area, the latter being characterized by the largest V components.