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Seismological temporal patterns at Mefite d'Ansanto CO_2 emission field.

Simona Morabito, Lucia Nardone, Simona Petrosino, and Paola Cusano
Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Napoli - Osservatorio Vesuviano (simona.morabito@ingv.it)

Mefite d'Ansanto (Italy) is the largest non-volcanic CO_2 emission field on the Earth. The isotopic signature of the CO_2 testifies a deep origin of the gases emitted at this site, whose source is probably the mantle wedge beneath the Apennines along the Tyrrhenian side (Chiodini et al., 2010). Mefite is located between the Sannio and the Irpinia seismogenic regions, that are considered among the most active areas of the southern Apennines. The emission site falls at the northern tip of the Irpinia fault system that is associated with the destructive M_S = 6.9, 1980 Irpinia earthquake. The gas leakage from this zone is linked to active faulting that characterized the area and determined large historical earthquakes

A temporary acquisition survey close to the Mefite emission field was carried out between 8 June and 28 September 2020 by using a seismic array, named Array MEfite (AME), composed of seven short-period stations. We have analyzed the characteristics of the recorded background seismic noise, e.g., spectral properties, energy temporal pattern (RMS) and polarization (Montalbetti et al., 1970), and estimated site effects (Nakamura, 1989; http://www.geopsy.org/). The seismological temporal patterns have been compared with the meteorological parameters, such as temperature and rainfall, to find possible relationships with exogenous factors. We found a well-defined spatial pattern for the spectral components above 5 Hz, which appear clearly linked to the emission field dynamics. On the other hand, the spectral components below 5 Hz result from the overlapping of multiple sources, of both exogenous, such as anthropogenic and meteorological factors, and endogenous nature. Application of the Independent Component Analysis (ICA) technique (Hyvärinen et al., 2001) contributed to discriminate between natural and anthropogenic sources.

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