

Hydrothermal episodic tremor in the Campi Flegrei caldera

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The seismic monitoring network of Campi Flegrei takes advantage from a seismic array, named ARF, installed in 2010 in the central part of the caldera. ARF array is composed of 10 short period stations, and more than 2000 days of data have been recorded with great continuity since its installation. The results of array analysis at frequency 1.5 Hz and 2 Hz of the data recorded on January 30, 2015, show the presence of coherent bursts of energy for many hours during the day, particularly from 12:00 to 15:00. After careful observation of such signals at all available seismic stations, we classified such signals as volcanic tremor of hydrothermal origin. This is the first observation by modern instruments of such kind of signals in Campi Flegrei.

The coherent signals have low signal to noise ratio, but all of them are characterized by the same backazimuth from SE (between 135 and 150 degrees) and similar apparent velocity of about 0.7 km/s. Spectral contents and waveform features suggest that each burst of coherent energy is a small shallow LF earthquake. Counting individual events is not possible because often they are too close in time to each other and they have different amplitude among them, thus the resulting signal looks likely produced by a nearly continuous source. A careful observation of the strongest signals at the stations of the local network permits a raw location of the epicentral area, although with a large uncertainty. The low apparent velocity indicates that the source must be quite shallow, probably no more than 0.5 km.