



Borehole geophysical monitoring at Campi Flegrei - Mt. Vesuvius, Italy

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In 2004 it started a research project for the development of a monitoring network of broad-band borehole geophysical instruments in the Vesuvius-Campi Flegrei volcanic region. Its goal is to detect very small signals linked to magma pressure fluctuations and magma and fluid transport mechanisms.

The network consists of 7 stations, each equipped with one Sacks-Evertson strainmeter and one seismometer. Strainmeters can detect volumetric strain changes ($\Delta V/V$ down to 10^{-11}), and borehole installation of the seismometers (about 100 m in depth) allows a better discrimination of the signals and an enhancement of the instrumental sensitivity with respect to surface installation. The data acquisition system of each station consists of one 6-channel 24-bit Quanterra Q330 A/D converter and one PB14 data logger, able to buffer up to 20 Gb data in MSEED packets. Data are collected at two acquisition centres through ADSL telephonic lines, and stored in high capacity units (2Tbytes). A cluster of Linux-Mosix PCs, running parallel Lan-MPI software, is used for an almost real-time signal processing and data analysis.

A prototype station had already been installed in 1998. It provides high quality data in spite of the presence of high-level cultural noise and the location within the aquifer. The first data collected by the network during 2004 confirm the high performance of this system in spite of the non-optimal coupling of the strainmeters to the volcanic rocks found at about 200 m in depth beneath Campi Flegrei and Mt. Vesuvius.