



Detection of a new uplift episode of Campi Flegrei through a network of borehole strainmeters and seismometers

R. Scarpa (1,2), A. Amoruso (1), L. Crescentini (1), P. Romano, W. De Cesare (2), M. Martini (2), G. Scarpatò (2), A.T. Linde (3), S.I. Sacks S (3)

(1) Dipartimento di Fisica, Università di Salerno, Italy, (2) Osservatorio Vesuviano, INGV, Italy, (3) Department of Terrestrial Magnetism, Carnegie Institution, Washington D.C., U.S.A. (Roberto.Scarpa@sa.infn.it / Fax: +3989965215 / Phone: +3989965248)

A research project aimed to the development of a monitoring network of broad-band, high sensitive, borehole geophysical instruments started, since 2004, in the Vesuvius-Campi Flegrei volcanic region. This network consists of 7 Sacks-Evertson borehole strainmeters and 11 GEOTECH KS2000 broad-band three component borehole seismometers, planned to detect very small signals linked to magma pressure fluctuations and magma and fluid transport mechanisms. Borehole strainmeters can detect volumetric strain changes ($\delta V/V$) down to 10^{-11} and the seismometers, installed at about 100 m depth, may allow a better discrimination of the signals and enhance their sensitivity due to the reduced high frequency environmental noise at depth. A first prototype of this equipment has been installed in 1998, providing high quality data in spite of the type of environment, the presence of high level cultural noise and the location within the aquifer. The data collected since 2004 confirm the high performance of the system in spite of the not yet optimal coupling of the strainmeters to the volcanic rocks found at about 200 m depth beneath Campi Flegrei and Mt. Vesuvius. The signals coming from this network are centralized at two different data acquisition centres, formed by high capacity storage units (HP MSA 1500 having 2.7TB), through ADSL telephonic lines, allowing an almost real time data analysis. At each station six channels 24 bit Quanterra Q330 and PB14, buffering up to 20 Gb data in MSEED packets, are used as data acquisition systems. A cluster HP Proliant DL140 consisting of 15 PC HP 3.4 GHz dual processors 3GB RAM, working with parallel Red Hat Linux software, is used for real-time signal processing.

The data collected at the strainmeters in the Campi Flegrei region during 2005 show the occurrence of several slow earthquakes. In the same year two swarms of volcano-tectonic microearthquakes occurred during March and October after a quiescence dating back to spring 2000. These events may be related to a new episode of uplift of this volcanic region. The uplift is characterized by a low amplitude and broad spatial extent, amounting to about one cm, started since November 2004.