Geophysical Research Abstracts, Vol. 8, 09701, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09701

Campi Flegrei caldera monitoring with short GPS observation times

G. Pugliano (1), M. Crisci (2), F. Obrizzo (3), F. Pingue (3), V. Sepe (3)

(1) Parthenope University of Naples, Italy, (2) Leica Geosystems-Italia, (3) INGV-Osservatorio Vesuviano, Napoli, Italy (giovanni.pugliano@uniparthenope.it)

Campi Flegrei is a caldera complex located to west of the city of Naples. The dynamics of this volcanic field was characterized by slow and continuous vertical movements as well known as Bradyseism. The secular trend of ground movement at Campi Flegrei is subsidence of the caldera. Superimposed on this long-term trend, some fast and intense episodes of ground uplift occurred (up to 2 m vertical in two years). Starting from 1969, Campi Flegrei was interested by two main uplift phases (1969-1972 and 1982-1984) and others minor with a maximum vertical displacement of about 3.5 m and with more than 15,000 earthquakes with magnitudes in the range 0.5-4.0. The presence of the active volcanoes in a very dense area needs continuous monitoring of the dynamics related to the pre-eruptive processes. Ground deformation represent an important precursor because it is linked to magma overpressure and migration through the rehological parameters characterising the volcanic rocks. At the Osservatorio Vesuviano-INGV the geodetic monitoring system is mainly based on GPS and precise leveling techniques: the Geodesy department installed a network of permanent continuously operated GPS stations and spirit leveling networks. Deformation monitoring using GPS is usually carried out by sampling data at a 30 second interval and estimating positions at 24-hour intervals by batch method. This paper presents a GPS test utilizing short observation times. Thanks to a greater rapidity, the near-instantaneous GPS positioning can be useful for periodic survey and for quickly solving field problems in period of crisis allowing to increase the number of points that can be determined in the area. Data were collected from 30 points with baselines no longer than approximately 10 km. A 4-hour session was observed for each point at a rate of 1 Hz. The results obtained by the instantaneous processing procedure were compared with the “true” coordinates obtained from the processing of the complete

4-hour session. As the kinematic technique requires the resolution of the phase ambiguities the impact of ambiguity resolution is described. The analysis in the position domain evaluates horizontal and vertical component accuracy.