Geophysical Research Abstracts, Vol. 8, 07636, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07636

Modeling of gas composition and gravity signals generated by hydrothermal circulation through heterogeneous porous media

M. Todesco (1)

G. Chiodini (2)

G. Berrino (2)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Bologna, Italy (todesco@bo.ingv.it), (2) Istituto Nazionale di Geofisica e Vulcanologia, Osservatorio Vesuviano, Napoli, Italy

Hydrothermal systems are known to play an important role in the evolution of active calderas: these volcanic systems periodically undergo dramatic unrest crises, commonly involving ground deformation, seismic activity and important changes in several geophysical and geochemical parameters monitored at the surface. These unrest crises may, or may not, culminate with a renewal of the eruptive activity, but in any case they bear important consequences in densely populated region. Early warning and a prompt evaluation of the state of evolution of the volcanic system are therefore essential to ensure a proper mitigation measures. A proper interpretation of monitoring data, however, is only achieved within the framework of a robust conceptual model of the system. Recent research work carried out at the Phlegrean Fields shows that the recent evolution of the caldera is consistent with the presence of a pulsating magmatic source, periodically discharging amounts of CO_2-enriched fluids into a shallow hydrothermal system. Such pulsating degassing affects the amount of heat and fluids entering the hydrothermal system, the distribution of fluid phases throughout the system and their composition. As a consequence, degassing controls not only the composition of fluids discharged at the surface, but also ground displacement and gravity residuals. In this work, hydrothermal heat and fluid flow through heterogeneous porous media was simulated to study how different degassing scenarios could affect the composition of discharged fluids and the gravity signals recorded at the surface.