Geophysical Research Abstracts, Vol. 7, 06841, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06841

Seismic tomography of 2001 and 2002-2003 Mt. Etna lateral eruptions

O. Cocina (1), G. Barberi (1), C. Chiarabba (2), P. De Gori (2), D. Patanè (1)

(1) Istituto Nazionale di Geofisica e Vulcanologia - Sezione di Catania, Catania, Italy, (2) Istituto Nazionale di Geofisica e Vulcanologia - CNT, Roma, Italy (cocina@ct.ingv.it / +39 095 7165836)

The results of a velocity tomographic study during 2001 and 2002-2003 Mt Etna flank eruptions are here presented. The aim of this analysis is to investigate temporal variations of the shallow plumbing system. The algorithm used is SIMULPS14 (Thurber, 1983; modified by Eberhart-Phillips, 1993 e Eberhart-Phillips & Reyners, 1997) which calculated P wave velocity (Vp) and V_p/V_s ratio on a 3D grid of nodes.

This study allowed a detailed reconstruction of the upper Vp structure from the top of the volcano until 6 km b.s.l. The definition of the shape and geometry of the high velocity body beneath the Central Craters area and the SE flank of the volcano, evidenced by previous tomographic studies, is now improved. The most intriguing result is the presence of a volume with low value of Vp/Vs ratio, located in the zone where the magma intruded during 2002-2003 lateral eruption. In literature, an increase in Vp/Vs ratio has been related to an increase in temperature, fracturing and, in particular, to the presence of partially molten mass . Instead, a relative low value in Vp/Vs ratio is usually associated with molten material wealthy in gas o fluids in a supercritical state. This anomaly has been already observed during the 2001 lateral eruption (Patanè et al., 2002). During 2002-2003 eruption this anomalous volume was wider and better defined with respect to previous one. This justifies the long duration of this last eruptive phase and its intense explosive activity.

In a volcanic area, the time repetition of tomographic images, may represent a useful tool to detect migration of gas-enriched magmatic mass, beneath mafic volcanoes like Etna, representing a possible method of monitoring to forecast volcanic eruption with high level of explosivity.