Geophysical Research Abstracts, Vol. 8, 01926, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01926

Geophysical evidences of the plumbing system of Stromboli volcano (Aeolian Islands, Italy)

M. Mattia, M. Aloisi, F. Ferrari, G. Di Grazia
Istituto Nazionale di Geofisica e Vulcanologia - Sezione di Catania

In this work we report the results of an integrated approach between seismological and geodetic data provided by the Stromboli volcano monitoring systems during the last six years. The data integrated analysis evidences some important features and relationships between the ground deformation observations and the seismo-volcanic activity. The main result we found is that the NE trending faults of the islands are periodically injected with new magma from deeper parts of the plumbing system of the volcano; during those periods, clear evidences of variations in both ground deformation and some seismic parameters are recognized. The data bringing around this result are that the increase of areal strain computed by the GPS network, for instance, seems to regularly precede phases of increasing in tremor and/or explosive activity. These phenomena are observed with different magnitude, but the pattern is almost always the same and can be related to injections of fresh magma in shallow plumbing system. The source of these injections has been spatially located from the inversion of geodetic data. On 28 December 2002 a new flank eruption started at Stromboli, after almost a year of growing explosive activity from the summit craters. Effusion of lava took place from several vents along the Sciara del Fuoco (SDF), a steep valley that cuts the NW flank of the volcano. The lava flow along the Sciara stopped on 22 July 2003. The final 1-2 months of the eruption were characterized by an abrupt increase both in number of explosion and intensity in the strombolian activity from the NE crater. Since May 2003 an increase of areal dilation at the scale of the entire volcano was recorded, as well the amplitude of the volcanic tremor recorded at all stations of the INGV broad-band seismic network increased significantly since the second half of May. Afterward, the ground deformation and the pattern of tremor showed marked oscillation in its amplitude similarly each other. These new evidences support the hypothesis of a simple plumbing system with different levels of magma storage, that

periodically push up small batches of magma along the main NE-SW tectonic trend that cuts the volcano. Moreover the very weak signals, in terms of ground deformations, and if compared with other Sicilian volcanoes, is a direct confirm of the small scale dimensions of the magmatic system of Stromboli Island.