



Joint inversion of displacement and gravity changes at Mt. Etna volcano during the 1995-2000 period: results and conclusions

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Persistent inflation and long-period gravity fluctuations were observed at Mt. Etna (Italy) during the time interval bounded by the 1991-93 and 2001 main flank eruptions. Past studies suggest that, since 1993 and before the 2001 eruption, a large amount of magma was stored at depth. Until now, a joint inversion of displacement and gravity data has not been performed. We carry out simultaneous inversion of gravity, GNSS and Advanced Differential InSAR displacement data covering the 1995-2000 period. Our inversion scheme uses bodies with a 3D free geometry to determine the best-fitting configuration of pressure and density sources. Results provide new insight into the shallow plumbing system of Etna. Inflation pressure sources are located below the northwestern flank, at depths of 4-6 km, while a mass source is located in a shallower position below the SE flank. Mass increases and decreases are observed without significant associated deformation. The neat separation between mass and pressure sources is a key feature to understand the processes which controlled the activity of Mt Etna during the studied period.