

# **The role of potential fields in imaging the intrusive mechanisms of recent eruptions on Mt Etna**

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Paroxysmal volcanic events lead to a wide range of underground processes that induce modifications of the thermodynamic state and/or stress field within the volcanic edifice, and thus changes in several geophysical parameters measurable at the surface. In particular, changes in potential fields have proven to be effective for early-warning purposes, in some edge cases, the only measurable effect of the ascent of the multiphase magmatic mixture through the plumbing system of a volcano. The ability to model volcano-related changes in the potential fields can thus represent a key factor for civil defence purposes. We briefly summarize results obtained for different series of gravity and magnetic data recorded on the Mt Etna volcano in these years: (i) during the 1981 fissure eruption; (ii) immediately after 1989 magmatic intrusion; (iii) throughout the 1995 explosive activity; (iv) during the 2001 lateral eruption, and (v) at the onset of the 2002 eruption. All these observations have led to significant advances in the systematic study of the amplitude and the origin of measurable gravity and magnetic effects, which could be a guide to better understand the mechanisms which create potential fields in the study area.