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Retrieval of inflation point parameters from geodetic data in the presence of a partially locked ring fault.

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As volcanic activity frequently produces detectable deformation and gravity changes, nets of high-quality instruments have been installed around several volcanoes. They generate observational data that can be inverted to enlight processes occurring in the volcano. While routine inversions are often accomplished using simple source and Earth models (e. g. a Mogi source in a uniform half-space), it is very important to incorporate more realistic features, like the vertical structure of the surrounding medium or the presence of deformation sources other than inflation points. We are developing inversion codes for near real-time applications in alert systems, taking advantage of recently published fast codes for computing deformation and gravity change in layered media, after adapting them to our needs and incorporating deformation sources of interest in Italian volcanic regions.

In the case of the Campi Flegrei area, the importance of considering the effects of the caldera boundaries, modelled as ring faults free to slip under the effect of a deep source of overpressure, has been stressed by several volcanologists.

Here we show results of a systematic study of the effects of the presence of a ring fault when inverting deformation and gravity data for retrieving the features of an inflation point.

The ring fault is modelled as the lateral surface of a reversed conical frustum. The inflation point is located at different depths and distances from the axis of the ring fault. When inflation generates shear stress on the ring fault, it can slip relaxing a variable amount of stress. The medium is considered homogeneous or layered (a soft layer overlaying a uniform half-space).

For each configuration, we invert synthetics both taking into account the presence

of the ring fault and in case of a Mogi source in a uniform half-space. Retrieved parameters of the center of expansion are finally compared.