



The stress field in Campi Flegrei caldera by joint inversion of seismological and ground deformation data

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Campi Flegrei caldera is an active volcanic complex characterized, in the last decades, by seismic activity, gas emissions and ground deformation. On the period 1982-84, a bradyseismic crisis, with a total uplift of about 2 m, accompanied by intense seismicity, affected this area. The aim of this work is to determine the spatial and temporal variations of the stress field within Campi Flegrei caldera by applying a joint inversion of geodetic and seismological data.

Geodetic data consist in about 1100 optical levelling measurements in the interval 1982-1985. The non-linear inversion of the data has shown that the best-fit source, for this interval, is a simple sub-horizontal Okada crack. Our hypothesis is that the stress field within the caldera results from: gravity, the Okada source and a background regional stress. To determine the latter field we used a seismological dataset consisting of 265 focal mechanisms related to the interval 1983-1984.

Applying different stress-inversion methods (multi-inverse, RDM and RTM) we have determined a time-varying stress field in that area and using a non-linear approach we have determined the best-fit regional stress tensor.

Results show that most of the stress field of the area is mainly related to the volcanic source, showing a nearly vertical σ_1 axis and a sub-horizontal σ_3 . A weak extensional N-S regional stress field drives the orientation of the σ_3 axes.