



Campi Flegrei Caldera Crustal Dynamics inferred by borehole tiltmeters

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The present study deals with the analysis of tiltmetric time series recorded at borehole instruments recently installed at Campi Flegrei caldera, a volcanic area subjected to the phenomenon of bradyseism. For the first time, we evaluate the crustal response in terms of ground tilting of the entire caldera to external excitations such as long/medium period tidal constituents, by adopting a nonlinear technique. Indeed, we recognize diurnal (solar) and long-period (fortnightly and monthly) components, which cause an oscillatory deformation pattern, superimposed to the normal deformation trend of the area. We further evidence that the tilting plane orientations are controlled by the local stress field and the structural features. Moreover, the amplitude of the tilt reflects the rheology of the site.

These observations indicate the occurrence of structural and thermoelastic site effects. Their knowledge is useful not only for removing the external tidal contribution in the tiltmetric series, but also for improving in delineating the local geology and focusing on the internal sources related to the volcano dynamics.

The promising results we obtain lead us to believe that the same approach can be extended to other tiltmetric networks in volcanic areas, for thorough and detailed analyses of the tiltmetric time series and more accurate studies of the endogenous sources.