

# **MECHANICAL COUPLING BETWEEN EARTHQUAKES AND VOLCANOES INFERRED FROM STRESS TRANSFER MODELS: EVIDENCE FROM VESUVIO, ETNA AND ALBAN HILLS (ITALY)**

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We investigate the mechanical interactions between tectonic faults and volcanic sources through elastic stress transfer and discuss the results of several applications to Italian active volcanoes. We first present the stress modeling results that point out a two-way coupling between Vesuvius eruptions and historical earthquakes in Southern Apennines, which allow us to provide a physical interpretation of their statistical correlation. Therefore, we explore the elastic stress interaction between historical eruptions at the Etna volcano and the largest earthquakes in Eastern Sicily and Calabria. We show that the large 1693 seismic event caused an increase of compressive stress along the rift zone, which can be associated to the lack of flank eruptions of the Etna volcano for about 70 years after the earthquake. Moreover, the largest Etna eruptions preceded by few decades the large 1693 seismic event. Our modeling results clearly suggest that all these catastrophic events are tectonically coupled. We also investigate the effect of elastic stress perturbations on the instrumental seismicity caused by magma inflation at depth both at the Etna and at the Alban Hills volcanoes. In particular, we model the seismicity pattern at the Alban Hills volcano (central Italy) during a seismic swarm occurred in 1989-90 and we interpret it in terms of Coulomb stress changes caused by magmatic processes in an extensional tectonic stress field. We verify that the earthquakes occur in areas of Coulomb stress increase and that their faulting mechanisms are consistent with the stress perturbation induced by the volcanic source. Our results suggest a link between faults and volcanic sources, which we interpret as a tectonic coupling explaining the seismicity in a large area surrounding the volcanoes.