



## **The stress field beneath Mt. Vesuvius (Southern Italy)**

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The Somma-Vesuvius is the smallest and one of the youngest volcanoes of the Neapolitan district. Its origin is linked to a Late Pleistocene-Holocene extension occurred along the entire Tyrrhenian margin of the Apennine chain. Nowadays, Mt. Vesuvius is a quiescent strato-volcano.

Using different approaches and a comparison between observations and numerical models we have determined the spatial variations in the stress field beneath the volcano edifice. In order to achieve this target we have analyzed a focal mechanism dataset derived from 197 events recorded from Jan. 1999 to Jan. 2012.

The main results highlight the presence of two seismogenic volumes characterized by markedly different stress patterns. The two volumes are separated by a layer where the seismic strain release shows a significant decrease. Previous studies postulated the existence, at about the same depth, of a ductile layer allowing the spreading of the Mt. Vesuvius edifice. We interpreted the difference in the stress pattern within the two volumes as the effect of a mechanical decoupling caused by the aforementioned ductile layer. The stress pattern in the top volume is dominated by a reverse faulting style, which agrees with the hypothesis of a seismicity driven by the spreading process. On the other hand, the stress field determined for the deep volume is consistent with a background regional field locally perturbed by the effects of the topography and of heterogeneities in the volcanic structure. Since the seismicity of the deep volume shows an intermittent behaviour and has shown to be linked to geochemical variations in the fumaroles of the volcano, we hypothesize that it results from the effect of fluid injection episodes, possibly of magmatic origin, perturbing the pore pressure within the hydrothermal system. The retrieved changes in the stress pattern could indicate variations in volcano dynamics potentially linked to the intrusion of magma at shallow depth.