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Mt. Etna eruptive patterns from a clinopyroxene perspective

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The identification and study of fluctuations and patterns in the eruptive behavior of volcanoes can provide valuable information to predict future activity as well as understanding the dynamics of an ongoing eruption. Mt Etna, one of the world's most active volcanoes, is a natural laboratory exhibiting frequent volcanic activity with different eruptive styles. This constitutes an ideal framework to investigate eruptive patterns and gather insights on the link between the architecture and magmatic processes of the plumbing system and eruptive dynamics.

Here, we apply clinopyroxene thermobarometry and chemometry (from the literature and newly acquired analyses) to historical and recent Mt Etna eruptions with different eruptive behavior and duration, spanning from 1610 to 2013. The resulting pressure (P), temperature (T) and melt chemistry (X_{melt}) are compared across different eruptions and correlated with key volcanic parameters such as total erupted volume and duration of the eruptive event.

Preliminary results reveal significant differences in pre-eruptive P-T-X_{melt} estimates between eruptive events associated with varying styles and mechanisms. For instance, some eruptions, such as the 1974 or 2002-03 event, display a pressure range spanning the entire continental crust, whereas eruptions during the 17th century exhibit a more restricted range confined within the crust.