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# The added value of time-variable microgravimetry to the understanding of how volcanoes work

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**Abstract**

During the past few decades, time-variable volcano gravimetry has shown great potential for imaging subsurface processes at active volcanoes (including some processes that might otherwise remain "hidden"), especially when combined with other methods (e.g., ground deformation, seismicity, and gas emissions). By supplying information on changes in the distribution of bulk mass over time, gravimetry can provide information regarding processes such as magma accumulation in void space, gas segregation at shallow depths, and mechanisms driving volcanic uplift and subsidence.

Despite its potential, time-variable volcano gravimetry is an underexploited method, not widely adopted by volcano researchers or observatories. The cost of instrumentation and the difficulty in using it under harsh environmental conditions is a significant impediment to the exploitation of gravimetry at many volcanoes. In addition, retrieving useful information from gravity changes in noisy volcanic environments is a major challenge. While these difficulties are not trivial, neither are they insurmountable; indeed, creative efforts in a variety of volcanic settings highlight the value of time-