

# LiveMT: An Automated suite for real-time Magnetotelluric monitoring

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## SUMMARY

Advances in magnetotelluric (MT) instrumentation now enable continuous real-time data transmission from MT stations to a local server for storage, processing, and analysis. This development facilitates the detection of changes in the electrical conductivity of the subsurface, making MT an ideal tool for long-term monitoring.

Active volcanic areas are prime targets for understanding the evolving petrological characteristics of the subsurface, including variations in physical, chemical, and thermal properties. Electrical conductivity is particularly effective for mapping magma dynamics and understanding how hydrothermal fluids modify the electrical properties of magmatic systems. Few experiments have conducted repeated MT measurements to track changes in a magmatic system after an eruptive phase, and even fewer have identified developments in magma transport. Key questions in MT monitoring include: Are the changes substantial enough to be detected? What transfer functions and periods should we analyze? How long should we observe to detect changes? To contribute to this field, we have developed an MT monitoring system that automates real-time processing of time series data currently being acquired and streamed from strategic, volcanically active zones.

In this work, we present two case studies: 1) an explosive and active episode of Stromboli volcano, Italy, and 2) the temporal variation of electromagnetic transfer functions due to the extreme-G5 Geomagnetic Storm in May 2024. Are the observed changes in transfer functions due to subsurface alterations? Preliminary results show significant temporal variation in MT responses. These changes, along with remote-reference multi-site robust processing to improve response estimations, must be cross-verified with other monitoring variables (e.g., atmospheric conditions, earthquakes, space weather) to determine if they are due to external factors or subsurface evolution of the magmatic system.

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