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One Volcano, Multiple Approaches: A Collaborative Study of Mount Fuji's Seismic Activity

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Mount Fuji, located approximately 100 km from Tokyo, threatens more than 30 million people. Despite its last eruption in 1707, the volcano has remained quiet for over three centuries, resulting in relatively limited monitoring and an incomplete understanding of its current state and future eruptive potential.

The aim of this study is to understand how seismic observations can reveal the internal structure and dynamics of Mount Fuji in order to better detect and track magma migration. Reaching this objective relies on close multidisciplinary collaboration, combining complementary expertise to address the volcano's complexity.

We present a unified framework built on two complementary approaches. The first develops an automatic detection and classification strategy for seismic activity using machine learning. By combining wavefield coherence analysis (CovSeisNet) with dimensionality reduction (UMAP), we extract and organize coherent seismic patterns, enabling the identification of known events while revealing previously unresolved structures in the volcano's activity.

To interpret these patterns physically, the second approach investigates the P-wave coda, whose scattered energy is highly sensitive to structural heterogeneities beneath the volcano. This analysis provides constraints on the internal structure and dynamic processes responsible for the observed seismic signatures.

By integrating signal processing and physical modeling within a joint project, we aim to construct a four-dimensional view of source mechanisms and structural evolution beneath Mount Fuji. This collaborative strategy represents a step toward improved monitoring and more robust early-warning capabilities.

Speaker information

PhD 3rd year

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