

Frequency-dependent seismic coda-attenuation imaging of volcanic geomorphology: from debris flows at Mount St. Helens volcano to cross-faulting at Campi Flegrei caldera.

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The stochastic loss of energy measured using the later portion of seismic recordings (coda) can be used to image and monitor geomorphology in volcanoes, once appropriate sensitivity kernels for the application of attenuation tomography have been developed. The use of this advanced seismic method with GIS/InSAR techniques is an unexplored field, which is receiving increasing attention in volcano-seismology.

By using this integrated approach we can image structure and monitor dynamics of the debris flow that followed the 1980 explosive eruption of Mount St. Helens (US) volcano at resolution similar to that of remote sensing data, and depths of <20 meters. When the volcano has not erupted, attenuation anomalies are instead spatially correlated with the regions of highest structural complexity and cross faulting. At Campi Flegrei, Italy, the results provide a novel perspective on the links between deep fluid migration and surface structures. The implications of the proposed approach on volcano monitoring are evident.