High-Resolution Passive Imaging beneath Valles Caldera

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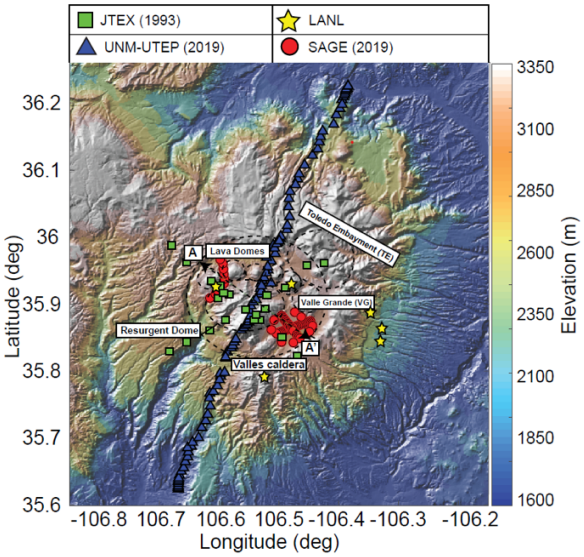
Abstract:

As part of a UTEP/UNM collaboration, we aim to resolve the internal structure of Valles Caldera, one of North America's quaternary supervolcanoes located near several metropolitan areas, including Albuquerque and Los Alamos, New Mexico. Our study focuses on inferring the current state of the magmatic system beneath the volcano through leveraging scattering properties of the ~80km caldera system. We jointly implement horizontal-to-vertical ratios (H/V), noise autocorrelations (AC), and P-wave receiver functions (P-RFs) in a multi-scale effort to identify structural discontinuities and study previous hypotheses concerning the eruptive state of the edifice. 1-month passive seismic recordings on a line of 97 3-component nodes across the caldera in 2019 are used to study significant near-surface structures related to caldera collapse, backfill, and dome resurgence, and to extricate these features from deeper and more subtle Moho signatures that have been elusive to date. ACs, PRFs, and H/V ratios are strongly sensitive to the magnitude of discontinuities, and these will subsequently be jointly inverted with surface wave dispersion measurements made from ambient noise correlation. The ultimate product of this study will be an accurate joint velocity model of the volcano that will address knowledge gaps concerning eruptive potential, seismic activity, and the general state of the magmatic system, all of which are currently unconstrained.



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