

## **Ignimbrite Lithic Fragment Characterization as a Tool for Exploring Beneath Volcanic Cover**

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Lithic fragments in post-mineral volcanic cover provide a testable exploration tool for investigating concealed mineralized systems. Hydrothermal alteration and mineralization are closely linked to magmatic-volcanic processes, yet many western U.S. systems likely remain concealed beneath extensive Eocene-Miocene ignimbrite sheets associated with post-Laramide extension and delamination of the Farallon plate. These ignimbrites blanket pre-volcanic landscapes, obscuring bedrock and limiting conventional field-based exploration. However, long-lived volcanic centers commonly undergo repeated intrusive, hydrothermal, and eruptive episodes. Mineralized or hydrothermally altered clasts may directly reflect a buried mineral system located beneath or adjacent to the source vent or caldera. Petrologic and geochemical characterization of lithic fragments provides a valuable means of sampling the concealed subvolcanic crust. Their lithological, mineralogical, and geochemical signatures can reveal the composition, alteration state, and potential mineralization of crustal units beneath a volcanic center, making lithics a powerful tool for reconstructing shallow crustal architecture. In regions where ignimbrites dominate and exposure is sparse, these fragments may provide the only direct physical evidence of buried hydrothermal alteration. Although previous isolated studies have documented this phenomenon, the approach has not been systematically applied to exploration. Grounded in well established magmatic-hydrothermal relationships, lithic fragment analysis represents a low cost, testable method for detecting concealed mineral systems beneath ignimbrite cover.