

We analyze near-repeating broadband seismograms from nearly 3,000 eruptions (2003–2011) from the Erebus volcano lava lake to investigate temporal changes in the shallow eruptive dynamics of an open conduit volcano. Cross-correlation analysis reveals progressive variable time lags between correlation-aligned short period (SP) and very long period (VLP) seismogram components ranging over approximately 1 s and evolving over weeks to months. Lava lake eruptions both excite an SP explosion seismic signal and gravitationally unload the conduit. After a delay of several seconds, this unloading excites a posteruptive, minute-long VLP seismic signal that persist for several minutes until the lava lake is refilled. VLP-SP lag variations are consistent across multiple seismic stations and are independent of eruption size, spectral characteristics, eruption frequency, and lava lake morphology changes. Lag changes are interpreted in terms of variable communication time between eruptions and the subsequent elastic and gravitational response of a tomographically imaged near-summit magma storage and VLP source region several hundred meters below the lava lake. Tomographic and VLP moment tensor studies, combined with modeling, suggest that the elastodynamic communication time between the distinct SP and VLP source regions is mediated by conduit-guided Stoneley waves within the uppermost magma-filled conduit system that are sensitive to small shallow conduit geometry changes. Conduit geometry changes may be driven by internal or external processes, including conduit wall melting and refreezing, repeated eruptive slug erosion, and deformation from inner crater inflation or collapse.