

Geophysical Insights into Magmatic Processes: Recent Advances from Alaska and Latin America

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Magmatic processes generate a wide range of seismic phenomena, and a pronounced increase in seismicity is one of the most consistently-observed precursors to a volcanic eruption. With the spread of permanent monitoring networks on volcanoes in recent decades, it has become evident that many (most?) episodes of volcano-seismic unrest do not immediately culminate in eruption. Furthermore, recent retrospective analyses of volcano-seismic data spanning full eruption cycles suggest a possible link between episodes of magma intrusion that do not immediately culminate in eruption and the nature of the eventual eruption (e.g., the nature of the run-up to eruption, the eruption’s duration and style). Where available, other geophysical observations, such as deformation and thermal emissions, corroborate this emerging perspective. This talk will focus on the unique challenges of conducting seismology research on volcanoes, and will highlight several recent case studies at volcanoes in Alaska and Latin America that demonstrate how volcano-seismic quiescence and unrest reflects magmatic processes on timescales from decades to seconds.

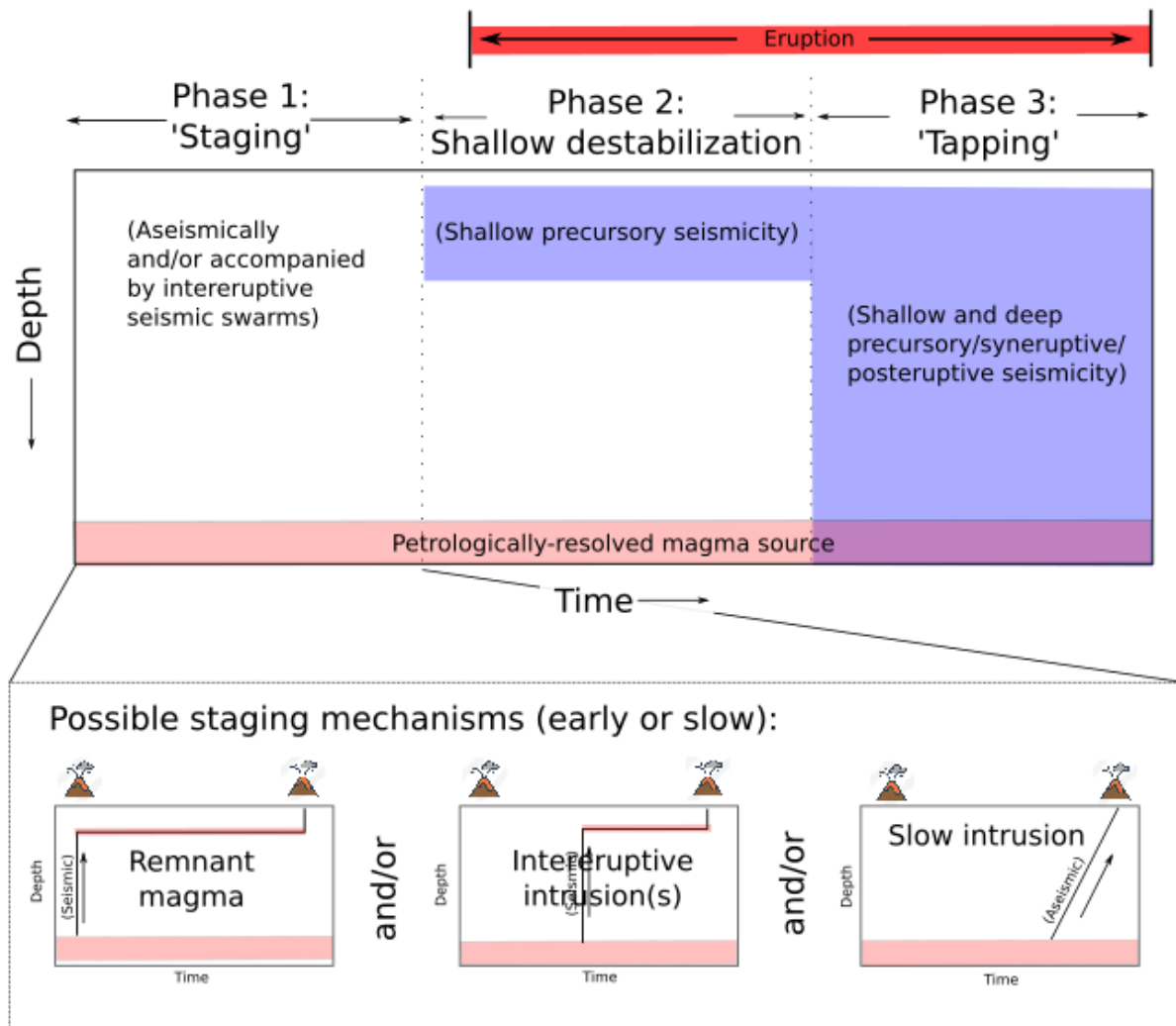


Figure after Roman and Cashman (2018). Conceptual three-phase model for magma ascent and eruption based on time-depth patterns of volcanic seismicity. The upper red bar indicates the time window during which eruption may begin (i.e., eruption may start any time after the onset of Phase 2).