The Apoyo Caldera in Nicaragua produced two Plinian eruptions separated by less than $10^3$ years time break emplacing the Lower Apoyo Tephra (LAT) and Upper Apoyo Tephra (UAT). Dacite magma stored at 9-13 km depth evolved by fractional crystallization and was modified by mixing with (1) mafic parental magma rising from 24-27 km depth, and (2) a low-Ti magma preserved as cumulate xenoliths, xenocrysts and mafic bands in mingled pumices.

Resorption and growth patterns of zoned phenocrysts document repeated mixing events. The most recent mixing events are recorded as three inflections in the vertical compositional zonation of the tephras (a) within LAT, (b) at the LAT-UAT transition, and (c) in the uppermost UAT.

(a) Abundant mingled pumices, xenocrysts and cumulate xenoliths compositionally similar to Granada Lineament low-Ti magmas, and absence of diffusive re-homogenization, suggest admixing of the mafic components to the dacitic reservoir shortly before the LAT eruption. (b) Homogenization of the LAT mingled magmas during the break in volcanic activity led to the more homogeneous UAT composition. However, incompatible trace element contents in UAT are higher than those in LAT dacite and imply continued fractional crystallization during homogenization. (c) The less evolved bulk composition and a much wider scatter in glass compositions of the uppermost UAT coincide with a coarsening in tephra grain size which indicates an increasing mass discharge rate of the eruption. At such high discharge rates, deeper, less evolved levels of the magma chamber were tapped leading to intense syneruptive magma mingling in the conduit.