The Cerro Galán system is a long-lived (>3.5 Ma) resurgent caldera complex in northwestern Argentina. Eight crystal-rich (up to 50%) high-K, rhyodacitic ignimbrites with minimum volumes from ~10-630 km$^3$ (DRE), erupted from ~5.6 to 2.1 Ma ($^{40}$Ar/$^{39}$Ar biotite/sanidine ages) at <100 kyr to >1 Myr intervals, culminating in the largest, climactic supereruption producing the Cerro Galán Ignimbrite.

Mafic and silicic magmas erupted at Galán are typical of the Central Andes and are the surface signal of a long-lived, high intensity input of mantle-derived magma into the lower crust. Mafic parental magmas to these systems with baseline radiogenic and stable isotopic compositions formed in the lower crust. Subsequent migration to mid and upper crustal storage zones resulted in differentiation to intermediate and then silicic compositions by variable amounts and types of crustal assimilation and fractional crystallisation. Isotopic modeling suggests that ~40-50% of high-$\delta^{18}$O crustal material mixed with mantle-derived basalt. Amphibole geobarometry and melt inclusion volatile contents indicate that pre-eruptive storage and differentiation took place at 3-7 km depth.

Magma compositions changed very little in >3.5 Myr of eruptive activity. $^{238}$U/$^{206}$Pb SIMS ages of zircon crystals suggest 200-300 kyr magma residence times with ignimbrites containing a population of antecrysts recycled from previous eruption cycles and xenocrysts incorporated from basement rocks. The volume-time-composition data suggest a long-lived, episodic magma system of increasing intensity that operated beneath Galán until ~2.1 Ma. The large eruptive cycles at Galán have evidence of recharge by hotter and more volatile-rich silicic magma that may have triggered the eruptions.