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Geochemical, isotopic (Sr-Nd-Pb) and geochronological (Ar-Ar and U-Pb) constraints on Quaternary bimodal volcanism of the Nigde Volcanic Complex (Central Anatolia, Turkey)

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The Nigde Volcanic Complex (NVC) is a major Late Neogene-Quaternary volcanic centre within the Cappadocian Volcanic Province of Central Anatolia. The Late Neogene evolution of the NVC generally initiated with the eruption of extensive andesitic-dacitic lavas and pyroclastic flow deposits, and minor basaltic lavas. This stage was followed by a Quaternary bimodal magma suite which forms Na-alkaline/transitional basaltic and high-K calc-alkaline to alkaline silicic volcanic rocks.

In this study, we present new geochemical, isotopic (Sr-Nd-Pb) and geochronological (Ar-Ar and U-Pb) data for the bimodal volcanic suite within the NVC. Recent data suggest that the eruption of this suite took place ranges between ∼650 and ∼220 ka (Middle-Late Pleistocene). Silicic rocks consisting of rhyolite and associated pumice-rich pyroclastic fall out and surge deposits define a narrow range of $^{143}Nd/^{144}Nd$ isotope ratios (0.5126-0.5127), and show virtually no difference in Pb isotope composition ($^{206}Pb/^{204}Pb$ = 18.84-18.87, $^{207}Pb/^{204}Pb$ = 15.64-15.67 and $^{208}Pb/^{204}Pb$ = 38.93-38.99). $^{87}Sr/^{86}Sr$ isotopic compositions of the silicic (0.704-0.705) and basaltic rocks (0.703-0.705) are rather similar reflecting a common source**.** The most mafic sample from basaltic rocks related to monogenetic cones is characterized by $^{87}Sr/^{86}Sr$ = 0.704, $^{143}Nd/^{144}Nd$ = 0.5127, $^{206}Pb/^{204}Pb$ = 18.80, $^{207}Pb/^{204}Pb$ = 15.60 and $^{208}Pb/^{204}Pb$ = 38.68. These values suggest a moderately depleted signature of the mantle source.

The geochronological and geochemical data suggest that NVC silicic and basaltic rocks are genetically closely related to each other. Mantle derived differentiated basaltic melts which experienced low degree of crustal assimilation are suggested to be the parent melt of the rhyolites. Further investigations will focus on the spatial and temporal evolution of Quaternary bimodal magma suite in the NVC and the genetic relation between silicic and basaltic rocks through detailed oxygen isotope analysis and (U-Th)/He zircon geochronology.