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Temporal constraints on intra-plate rifting of Central Anatolia: Timescales of bimodal volcanism in Acıgöl area.

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Continental Central Anatolian Volcanic Province is located on a high plateau at 1400-1500m, shaped by Miocene – Holocene volcanism with a variety of volcanic rocks intercalated with Neogene continental sediments. The region is also known as Cappadocia and famous for its spectacular landforms. Upper Miocene-Pliocene volcanism in the area is characterized by medium-to-high K, calc-alkaline andesitic-dacitic effusive products (lava flows and dome emplacements) and 9 major high-K rhyolitic ignimbrite sheets erupted mostly from hidden calderas. On the other hand, Quaternary volcanism in Acıgöl area is represented by bimodal basaltic and rhyolitic activity with a lack of intermediate compositions depicting a Daly Gap between 60% and 72% SiO_2. Quaternary rhyolitic activity is represented by dome emplacements, associated lava flows and pyroclastic eruptions. Rhyolites are concentrated within an area of ∼800 km2, in Middle-Upper Pleistocene Acıgöl Complex in the north, in Lower Pleistocene Göllüdağ Complex in the south and in isolated Nenezi dome located at ∼12 km NW of Göllüdağ. The rhyolites of Nenezi dome and Göllüdağ complex exhibit similar geochemical characteristics but differ from those of Acıgöl Complex. One sample from Nenezi dome yielded a 40Ar/39Ar age of 1.48 ± 0.03 Ma, comparable to previously reported ages for Göllüdağ system.
Basaltic volcanism is represented by Pleistocene – Holocene monogenetic scoria cones and fissural lava flows situated on northern and western periphery of both complexes. To the north of Acıgöl complex, basaltic lavas depict at least two temporally discrete generations of eruption. The older flows are observed on topographic highs due to relief inversion and represent the oldest "true" basaltic compositions in the Acıgöl area (∼47% SiO_2, 7% MgO, 1.6% TiO_2). Two samples from these older lava flows yielded 40Ar/39Ar ages of 1.95 ± 0.08 Ma and 1.85 ± 0.07 Ma. On the contrary, younger generations of basaltic flows have effused in topographic lows of the area and follow a compositional evolution trend towards basaltic andesite and trachyandesite until Upper Pleistocene.
Radiometric data given above imply that, the earliest known basalts in Acıgöl area have erupted shortly before Göllüdağ rhyolites, only ∼50 km apart. Regarding the subsequent coeval basaltic and rhyolitic activity in the region until Upper Pleistocene - Holocene, the appearance of basalts ∼1.9 Ma ago indicates the initiation of bimodal volcanism in Acıgöl area. Bimodal magmatism and N-S extensional tectonic features observed in the area would be considered as the result of intra-plate rifting.