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Age- and compositional variations between Tertiary basaltic rocks from the Rhoen and Grabfeld (Heldburg Dike Swarm) areas of Thuringia, Germany

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Igneous rocks in the central part of the Cenozoic European Volcanic Province (CEVP) which we studied in the Rhoen and in the Grabfeld (Heldburg Dike Swarm) of Thuringia, in the Fichtelgebirge of Bavaria as well as in the Vogtland of SW Saxony show a distinct compositional trend: While in the former alkali basalts dominate over tholeiitic basalts and minor basanites, the magmas in the Grabfeld are mainly basanites dominating over alkali basalts and minor nephelinites. While in the Fichtelgebirge basanites and nephelinites occur in even amounts and melilite-bearing nephelinites being rare, nephelinites (often melilite-bearing) dominate over basanites and melilitites within the Vogtland. The data thus indicate a distinct trend in silica undersaturation within the mafic to ultramafic magmas towards east and towards the recent zone of earthquake swarms in the Vogtland and neighbored Cheb basin.

A similar trend seems to be present for the eruption ages within the different volcanic field as derived from precise radiogenic age dating. Here we present $^{40}Ar/^{39}Ar$ age data for Tertiary basaltic rocks from the Thuringian Rhoen and the Grabfeld (Heldburg Dike Swarm) areas. The data are derived by incremental heating of groundmass- and mineral separates and give considerably better constraints on the eruption ages within these volcanic fields of the CEVP than earlier whole rock K-Ar age data. All present radiometric ages but one outlier from a remote location range between 20 – 14 Ma, being thus similar to those of the neighbored Vogelsberg volcanic complex. The age

spectrum is clearly divided into two distinct subsets: volcanic rocks of the Rhoen date between 20 – 18 Ma, those of the southeastern located Grabfeld (Heldburg Dike Swarm) area date between 16 – 14 Ma. The present age data, clearly indicating a striking regional and temporal shift of Tertiary volcanic activity in SW Thuringia, as well as the compositional trend between volcanic fields in that region have to be accounted for in a model of melt generation within the CEVP.