The Oligo–Miocene alkaline basalt volcanism in Bulgaria

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The Oligo–Miocene alkaline volcanism in Bulgaria is characterised by the presence of a ca. 250 km N–S volcanic alignment which cuts all four tectonic units that occur in Bulgaria: Moesian Platform (North Bulgaria), Balkan and Srednogorie Zones (Central Bulgaria) and Rhodope Massif (South Bulgaria). The alkali basalt volcanism in the Moesian Platform is mainly represented by monogenetic volcanoes and/or extrusions while in the other tectonic units they occur as laccoliths, necks or small-scale dyke swarms. K/Ar age data are still scanty to produce a general picture of the alkaline volcanism in Bulgaria although the dykes located in the Rhodope Massif are 26–28 Ma old while those in Central and Northern Bulgaria are 4–6 Ma younger (24–19 Ma). Most of the Bulgarian alkaline basalts contain ultramafic and crustal xenoliths. In terms of classification, rocks in North and Central Bulgaria are olivine- and clinopyroxene-porphyric rocks belonging to the basanite-alkali basalt-trachybasalt series whereas those of the Rhodope Massif are of basanite-lamprophyre (camptonite) composition. Trace and Rare Earth element abundances are typical of those of intraplate alkaline volcanics with typical troughs at K and Rb in the Northern and Central Bulgaria whereas the Rhodope Massif basalts show flat patterns from Ba to La when they are normalised to C1-chondrite. Most Central Bulgarian basalts show relatively low Nb/La and Ce/Pb ratios suggesting that the primary magma was modified chemically by assimilation of lower and upper crustal material. These data are in good agreement with Sr, Nd, and Pb isotopes. Thus, the northernmost and southernmost alkaline rocks display a depleted character with low Sr and high Nd isotopic ratios while those from central Bulgaria have relatively higher Sr and lower Nd isotopic ratios. Slight differences in the isotopic Pb composition between the northern and central and southern rocks have also been observed. In summary, the Bulgarian Alkaline Basalt Volcanic Field is related to a magma derived from an asthenospheric mantle source which closely resembles the LVC and component A of the European Alkaline Basalts. Small amount of crustal contamination can be invoked for the central volcanics.