Towards depleted Sr–Nd isotopology from western to central Cenozoic volcanic Europe

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Primitive Cenozoic (65–4 Ma) volcanic lavas in central Europe (picrobasalts, basanites, olivine nephelinites, melilite-olivine nephelinites, polzenites) show large variability in $^{87}Sr/^{86}Sr$ and $^{143}Nd/^{144}Nd$ ratios, both at regional and local scale. Resolved differences exist in Sr–Nd isotope compositions among major volcanic centres of the Bohemian Massif that appear to relate to distinctive Sr–Nd signatures of their respective mantle sources. The most depleted signature unequivocally is associated with pristine lavas from NE margin of the Bohemian Massif located in SW Poland ($^{87}Sr/^{86}Sr_i$<0.7033, $^{143}Nd/^{144}Nd_i$>0.5129) that may support earlier suggestions of eastward-trending mantle depletion across European Tertiary basaltic volcanism [1] and appears to be consistent with highly depleted Hf isotope signature. Chemically evolved rocks (trachytes, rhyolites, phonolites) may carry particularly distinguished Sr isotope signature from prior accumulation of excessive Rb quantities resulting in resolved age-corrected initial $^{87}Sr/^{86}Sr$ whilst no such shift is observed for $^{143}Nd/^{144}Nd$. However, crustal contamination appears to be less significant for differentiated lithologies from central and eastern part of the Eger/Ohře rift system, suggested from the absence of a relationship between Mg number and $^{87}Sr/^{86}Sr$. Only the large Doupovské hory volcanic complex (DHVC) appears to carry an imprint of crustal contamination with clearly elevated $^{87}Sr/^{86}Sr$ at low Mg #. High $^{87}Sr/^{86}Sr_i$ >0.705 has been found for MB-7 basanite which clearly attests to significant modification through either crustal contamination or assimilation of carbonate-rich materials. Whilst large quantities of local crust can be excluded from major element considerations, modest assimilation of Cretaceous sediments dominating the area by the magma en route to the surface might have significantly altered the Sr (and Li) isotope composition without particularly influencing Nd. Following the Sr-Nd isotope variability along the profiles perpendicular to the main rift axis, the zone of relatively depleted mantle source can be traced along the southern margin of the Eger rift. The within-rift Sr–Nd isotope enrichment may plausibly be correlated with the presence of Variscan suture.

[1] Blusztajn & Hart (1989) *GCA* **53**, 2689-2696