Geochemical and mineralogical characteristic of current roadside pollution from experimental monitoring plots located in different countries

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The aim of the study was characterisation of current particulate pollutants emitted by traffic sources and deposited on roadside topsoil. For this purpose 7 cm of topsoil were removed and replaced by 30 plastic boxes filled with pure quartz matrix. Such experimental monitoring plots were installed in Poland, Germany, Finland, Tadjikistan, Greece and China close to arteries with high traffic volume. Geochemical analyses of some heavy metals (HM) were conducted by AAS (Fe, Mn, Zn, Pb, Cu) and ICP (Cd, Co, Mo and W) after extraction in aqua regia. Additionaly SEM and X-ray diffraction analyses were conducted in soil layer removed from monitoring place and in sand matrix after 1 and 2 years of exposition.

Chemical analyses of removed topsoils have shown that the highest contents of Fe, Mn, Zn, Pb, Cu were noted in Poland and Germany, but the highest amount of W was detected in Finland. After 1 and 2 years of exposure a big changes in HM content in quartz sand were observed. Contents of Fe, Mn, Zn and Pb in most monitoring plots were even three times higher after 2 years than after 1 year of exposure. There was significant increase of W in sand matrix after 2 years' exposure in samples from Finland.

Mineralogical analyses revealed different iron forms: metallic iron (α-Fe), Fe oxides (mostly magnetite and hematite), Fe-Zn and Fe-Cu oxides (ferrites) and other mineral components as: barite, aluminosilicates glassy phases and different kinds of spinels. In matrix from Finland plot tungsten carbide particles were also commonly observed.

Lithium isotope evidence for pervasive metasomatism of sub-continental lithospheric mantle

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We present Li contents and isotope compositions in a suite of spinel peridotite/harzburgite xenoliths, enclosed in Tertiary alkaline lavas from three volcanic centres in the western part of the Eger rift, Bohemian Massif, belonging to the European Cenozoic Rift System. Secondary features were observed in subset of xenoliths implying metasomatism by alkali-rich melts with carbonate affinity [1]. Whole-rock xenoliths show no to slight Li enrichment (1.4–5.8 ppm) coupled with extreme ^{7}Li depletion in some samples (δ^7Li from –9.7 to 2.5‰), attesting to dramatic departure from δ^7Li of pristine mantle (δ^7Li=3–4‰). More complex co-variations are observed for bulk δ^7Li and modal olivine, clinopyroxene and orthopyroxene for the three volcanic centres. δ^7Li values do not correlate with parameters of magmatic fractionation and/or fluid activity and are thus regarded as independent parameter of secondary metasomatism. However, carbonate-rich metasomatism does not impart specific Li signature to xenoliths that carry distinctive Nb–Ti enrichments in melt pockets [2]. On the contrary, relics of oceanic crust preserved as eclogites are ubiquitous in the wider area which may carry strongly negative δ^7Li values [3]. Their melts can metasomatize the sub-continental mantle and erase its intrinsic Li signature [4]. Therefore, we propose a scenario whereby xenoliths from the sub-continental mantle beneath central Europe were invaded by eclogitic melts formed at lower temperatures that carry distinctively light Li isotope compositions from earlier subduction of Saxothuringian lithosphere, operating in the area during the Devonian/Carboniferous although timing of the metasomatic imprint remains uncertain. Host alkaline basalts always have higher δ^7Li than the xenoliths, as also reported for xenoliths with mantle δ^7Li signature [5], implying uniform relationship of basalt–xenolith systems in continental settings.

[1] Špaček *et al*. (2013) *J Petrol*, in press; [2] Ackerman *et al*. (2013) *J Petrol*, under review; [3] Magna *et al*. (2004) *IJMS* **239**, 67-76; [4] Tang *et al*. (2012) *Lithos* **149**, 79-90; [5] Magna *et al*. (2008) *EPSL* **276**, 214-222

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