# PGE and Re systematics of arc picrites from the Solomon Islands: The effects of mantle wedge depletion and refertilisation

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Along the Solomon island arc, SW Pacific, the Indian-Australian plate is presently subducted beneath the Pacific plate. A special feature of this arc is the ocurrence of picritic lavas with up to ca. 30 wt.-% MgO above a young (< 5 Ma, e.g., [1]) mid-ocean ridge system (Woodlark Ridge) that is subducted beneath the New Georgia archipelago. Trace element abundances and combined Pb-Nd-Hf isotope data indicate a strong source overprint by subduction components (e.g., [2]), in particular by slab melts.

To constrain the sources of the picrites, combined Re+PGE and Os isotope measurements were carried out on a representative subset of picritic lavas. The picrites show PGE+Re abundances as observed in other arc lavas (ca. $10^{-3}$ chondritic, e.g., [3]) and largely parallel PGE+Re patterns with typically elevated Pt-Pd and low Os-Ir-Ru abundances. Iridium and Ru increase with Cr contents, supporting a model where Ir and Ru alloys are efficiently adsorbed by chromites [4]. Palladium exhibits a strong variation relative to Pt, and Pd abundances decrease with increasing Cr contents and $CaO/Al_2O_3$, possibly due to a higher fluid mobility of Pd [3]. $^{187}Os/^{188}Os$ values of 0.12646 to 0.12915 cover the full range between typical DMM- and PUM-like mantle domains. Osmium isotope ratios exhibit co-variations with La/Yb, Sr/Y, La/Sm, and $^{206}Pb/^{204}Pb$, suggesting a variable degree of refertilisation of the mantle wedge that was variably depleted and overprinted by subduction components, respectively. The refertilising component is assumed to be a slab melt that originates from the torn edges of the subducted parts of the active Woodlark Ridge [5].

[1] Weissel *et al.* (1982) *Tectonophysics* **87**, 253-277. [2] Schuth *et al.* (2004) *Contrib. Mineral. Petrol.* **148**, 288-304. [3] Woodland *et al.* (2002) *J. Petrol.* **45**, 171-190. [4] Laurenz *et al.* (2006) *GCA* **A** 344. [5] Schuth *et al.* (submitted) *J. Petrol.*

# Air particulate biomonitoring in the Greater Cologne Area, Germany

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Mineralogy, magnetic properties, elemental composition and molecular speciation of air particulates accumulated on pine needles from 75 locations covering 3000 $km^2$ of the Greater Cologne Area (GCA) were determined to unravel air pollutant sources and atmospheric distribution pathways.

Atmosphere in the GCA receives particulate emissions from various sources dominated by lignite fueled power plants, open pit lignite mining, urban traffic, domestic heating and large industrial complexes along the Rhine Valley. Temporal pollutant accumulation on pine needles occurs in a systematic and predictable manner derived from analyses of 3 to 50 month old needles. This allows for interpretation of spatial distribution maps for identification of emission hot spots and pollutant dispersal trends.

Source characterization based on element concentrations and element enrichment factors (after normalization to average upper crust) revealed that Mo was best suited to identify petrochemical emissions. Cu enrichment results from petrochemial emission as well as traffic sourcs. PGE were associated with urban high density traffic for Pt and Pd, the latter also affected by fertilizer application in rural areas. Ru and Re were less traffic dependent, the former being associated with industrial the latter with agricultural emissions. Traffic pollution was best depicted by enhanced Sb and Ba concentrations. Fe and V were shown also to be related to traffic emissions in urban areas but as well originate from power plant emissions. Excess Fe agreed excellent with magnetic susceptibility, with spherulitic magnetite formed upon combustion processes being the mineralogical phase carrying the magnetic signal. REM-EDX analyses reveals magnetite particles in the $PM_{1.0}$ class to carry most of the magnetization. Verification of emission sources was achieved by application of polycyclic aromatic hydrocarbon (PAH) pollution indicators. Lignite-fueled power plants were identified as the volumetrically most important PAH emitters. These mainly emit phenanthrene, cyclopentenophenanthrene, and dibenzothiophene. Urban traffic comprised the second most important spource for PAH and was characterized by higher loads of cyclopentenopyrene, alkylated phenanthrenes and different isomer patterns of methylphenanthrenes.

Inorganic and organic multiproxy air quality analyses allows for very reliable and independent source allocation even in areas with multiple emission sources.