Platinum Group Elements in sulfides from Yangliuping Cu-Ni-Pt-Pd Deposit in Sichuan, China

H.-L. DENG[1,2] A. J. CAMPBELL[2] AND M. HUMAYUN[2]

[1] Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, China (hldeng@public.gz.cn)
[2] Department of Geophysical Sciences, University of Chicago, Chicago, USA (hum8@midway.uchicago.edu)

Platinum group elements (PGE) are siderophile elements that can provide us important information about early evolution of the earth, and interaction between the core and mantle, and interplay between the earth's mantle and crust. Most of PGE in the mantle keep in sulfides that form inclusions in mantle silicates such as olivines and pyroxenes, or distribute in interstices between mantle silicates. PGE in different type of sulfides suggest their different origins, and indicate complex mantle processes that result in different PGE patterns. Continental flood basalts (CFB) have been thought as a result of mantle plume that originated from the earth's core-mantle boundary or deep mantle. PGE in sulfides from Cu-Ni sulfide ores in ultramafic layered intrusions that came from mantle and were related to mantle plume, can give us information on generation, fractionation, crystallization and assimilation of mantle magma, and on mantle geodynamics.

Yangliuping Cu-Ni-Pt-Pd deposit, an important ore deposit in northwester Sichuan in China, formed during Emeishan CFB eruption at Permian-Triassic boundary. Its layered ultramafic host rocks intruded into the Devonian-Carboniferous limestone and carbonaceous slate in a short-axis anticline. Serpentinization and talc developed well in the deposit. Most important sulfide associations are mono-sulfide solution (MSS), pyrrhotite, pentlandite, and chalcopyrite. Some PGE minerals such as laurite, PtS, Pt arsenide and so on were identified.

PGE in sulfides from Yangliuping deposit were analysed by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). Iron meteorite Hoba and Finomela were used as external standards because their PGE concentrations have been known well. Iron was chosen as internal standard to correct signal changes due to changes in laser ablated volume. PGE detections of limit change from 0.1ppb to 0.1ppm depend on the PGE concentration level in sulfides and on different types of sulfides. CI chondrite normalized PGE patterns of MSS, pyrrhotite and pentlandite show Pt-Pd enriched to different degrees. PGE pattern of chalcopyrite is incomplete because of $CuAr^+$ isobaric interference in Rh and Pd, and low PGE concentrations in chalcopyrites. Pt-Pd enriched PGE patterns agree with Pt-Pd incompatibility in mantle melting and intensive chalcophile trend during unmixing of silicate and sulfide melts. Regular changes in concentrations of Os, Ir, Rh and Ru reveal that oxygen fugacity was a very important factor controlling enrichment and fractionation of Os, Ir, Rh and Ru in magma.

Distribution of ^{238}U-serie disequilibria in a laterite. Geochemical implications.

O.DEQUINCEY, F.CHABAUX, J.C. LEPRUN*, N.CLAUER

CGS-EOST, CNRS UMR 7517, 1 rue Blessig, 67000 Strasbourg, France (odequinc / fchabaux / nclauer @illite.u-strasbg.fr)
* IRD, 911 avenue Agropolis, 34000 Montpellier, France (leprun@mpl.ird.fr)

In order to understand the parameters which control the ^{238}U-^{234}U-^{230}Th fractionations within weathering profile, the distribution of U and Th isotopes was studied in two profiles along a laterite toposequence, the Kaya ferricrete (Burkina Faso). This information is relevant for a correct use of U-serie disequilibria in dissolved and suspended loads of rivers for evaluating erosion rates at a watershed scale.

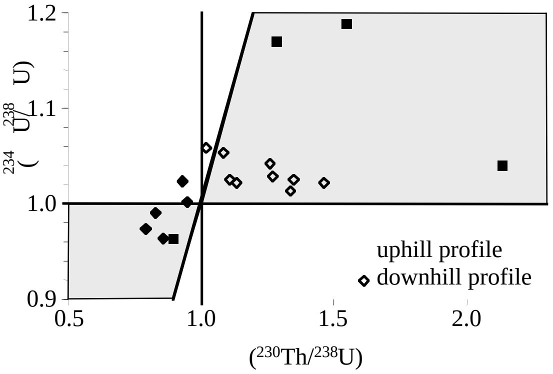

Figure. The data plot mostly in the grey-coloured forbidden zones of the (^{234}U/^{238}U) vs. (^{230}Th/^{238}U) diagram. Full symbols for samples from the top ferruginous hardcap.

Lateral differences in U-Th isotope distribution are observed (see Figure). However, the distribution of U/Th ratios points out in both profiles, that vertical U redistributions are the predominant U fluxes affecting the toposequence. As the samples are not at secular equilibrium, recent (<300ka) mobilizations are required. Moreover, the combined (^{234}U/^{238}U) and (^{230}Th/^{238}U) ratios are consistent with (1) a scenario of continuous U gains and losses affecting each horizon of the laterite, and (2) lateral differences controlled by the topographical positionmost probably in relation with the drainage efficiency, and by the retention capacity of iron oxides. The U-Th distribution and fractionation in this laterite landscape are then not only governed by the regional climatic and weathering conditions but also by the above-mentioned local parameters.

Is is then needed to quantify the U fluxes related to secondary redistributions relative to those derived primarily from bedrock-weathering, and to take into account the lateral variations linked to local parameters, if one wants to interpret U mass budgets and U-serie disequilibria in river waters in terms of weathering processes.